THE IRON TRADE REVIEW

Volume XLIII CLEVELAND, DECEMBER 3, 1908 Number 23

CAR BUYING

ADDS INTEREST TO A RATHER QUIET WEEK.

First Order for Open Hearth Rails to be Rolled at South Chicago — Cast Iron Pipe Interest in the Market.

Buying of steel cars in goodly numbers for various railroad interests has given reason for the belief that the placing of contracts for equipment will soon be an important feature of the market. It is generally believed, however, that important developments can not be expected during the present month, possibly not until spring, although a reasonable increase in business is anticipated.

Pig Iron Buying

The leading cast iron pipe interest is in the market for pig iron, and may close for 10,000 tons this week. In the Philadelphia market, negotiations are in progress for the purchase of 20,000 tons of basic. In most centers, however, inquiries are not numerous and sales are light, but quotations are well maintained. Virginia irons, which are selling somewhat lower than those of Alabama, are being shipped long distances. A leading southern interest booked 130,000 tons between Oct. 25 and Dec. 1.

Railway Orders

Orders for steel cars include 1,000 for the Grand Trunk, 275 for the American Steel & Wire Co., and 160 for the Birmingham Southern, all taken by the Pressed Steel Car Co.; an additional order of 500 for the Pittsburg & Lake Erie, which will be made by the American Car & Foundry Co.; 500 for the West Maryland railroad, to be turned out by the Cambria Steel Co. Purchases of rails include 13,000 for the Central of New Jersey, and an order of 1,200 tons of open-hearth rails, which will be the first open-hearth rails rolled at the South Chicago works of the Illinois Steel Co. Orders for 50,000 cases of spikes and bolts have been placed. During the past six weeks, 13 new lake freighters have been ordered, of which two freighters and one passenger boat were contracted for within a few days.

Iron Ore Shipments

The Steel Corporation has finished shipments of iron ore for the season, the total being 14,250,000 tons, a decrease of 8,300,000 tons compared with last year. A few vessels of independent interests are still out, but the season, which has been one of the most unprofitable in the history of the lake trade, is practically ended.

Iron and Steel Bars

The bar iron market is in rather unsatisfactory condition, as prices of scrap are so high that bars can not be sold at regular quotations and there has been no general advance. Individual mills are advancing quotations, the usual new asking price being $30 at the plant. The prevailing sentiment among steel bar makers is opposed to higher prices.

Structural Material

Figures are now being prepared on the great Equitable building in New York, which will require about 50,000 tons of steel. The American Bridge Co. is ordering 10,500 tons of structural material for the third open-hearth steel plant to be erected at Gary. Other important projects are under consideration, but the actual tonnage placed during the past week has been light.

Coke and Old Material

The tendency of old material prices in most centers is still upward, the feature of the market at Pittsburg being the high quotations on turnings and borings. There is limited contracting for coke.

LARGE ATTENDANCE

At the Opening Session of American Society of Mechanical Engineers.

(Special Telegram.)

New York, Dec. 1.—The annual meeting of the American Society of Mechanical Engineers convened for its first session in the Engineering Societies' building on Tuesday evening. The meeting promises to be highly successful, the attendance being the largest for any opening night in the history of the society.

The session was called to order in the auditorium on the third floor, and President Holman gave his address on "Conservation of Natural Resources." In it he outlined the work of the conference called by President Roosevelt last May, and then proceeded to show how the mechanical engineer is concerned in the movement. Incidentally he discussed the economic phase of conserving the health of the people and of the food supply of the country. Referring to the conservation of the lumber supply, the speaker suggested the substitution of fiber products for timber. The waste of fiber producing material is enormous and sources of future supply are practically undiscovered. Conservation of water supply is a problem of the irrigation engineer. The work of this man will comprise storage of water in times of plenty for use in times of shortage. The speaker classified water rights as domestic, irrigation, including ditch and storage rights, and power rights, and gave a synopsis of the different state laws defining the unit of measurement of flowing water. In this connection, the work done by the reclamation service in conserving water supplies was cited and statistics given.

The subject of water power is closely allied to the irrigation problem, but this is not a part of the conservation problem, except where legislation is necessary to protect against a loss of public rights. Conservation of coal resources is a question requiring great consideration. The outlook for improved mining is not good, and changes in fundamental laws are necessary before reforms can be effected. The loss of life in mining is unnec-

(Continued on page 921.)

THE WEEK IN IRON CENTERS

PITTSBURG.

More Confident Feeling as to Improvement—Pig Iron Less Active.

Office of THE IRON TRADE REVIEW,
510 Park Bldg., Dec. 1.

The iron and steel industry is moving more confidently toward the new year and a greater expectation of a firm recovery in business affairs in the not distant future is displayed. The month of November has materially advanced the hopes and plans of manufacturers bearing upon the market's prospects. Outside of the mere sentimental influence exerted more by satisfaction over the election than by the moderate increase of orders taken in that period, an encouraging note has been struck by the tangible evidence of the promotion of plans on the part of large consumers, particularly the railroads. This latter development is undergoing special emphasis at present, as it is declared that the country at large, exclusive of the railroads and their attendant activities, is doing reasonably well in its absorption of iron and steel materials and that with the addition of this support, a substantial approach to normal conditions would be sustained. Some iron and steel interests which draw their patronage from the general consuming trade without particular dependence upon railroad demand are now enjoying very comfortable circumstances.

The end of the year at hand, bringing with it inventory activities is not lending itself toward a consistent movement for the re-establishment of stocks in jobbers' hands, which for months have been at low ebb. There is the expectation current that the incoming first quarter will present a changed attitude on the part of these consumers, as already spasmodic efforts have been made in this direction.

The plate and shape market, which has been one of the most lacking in vigor, is showing some improvement from the influence of projects recently materializing, especially those as to steel car construction. Additional steel car orders placed in the week include those of the United States Steel Corporation and the Western Maryland railroad with an increased order by the Pittsburg & Lake Erie railroad. The pig iron market is quieting down, but prices have not weakened perceptibly. Iron and steel bars are more active.

Pig Iron.—The buying movement in pig iron which has extended over the past five or six weeks is less lively and the new inquiry appearing is not heavy. Prices are holding fairly firm around minimum quotations with occasional instances of full asking figures of furnace interests being realized.

The recovery in Bessemer iron from its low point of the year, a month ago, is illustrated in the average price from the valleys in November which was $15.84, or $16.74, delivered Pittsburg, compared with $14.58 valley, or $15.48 delivered in September, a gain of $1.26 a ton. The market rules from $16.50 to $17 valley. A sale of 300 tons for December, January and February was made at $16.50 valley and small transactions at $17 are reported. Some melters are figuring upon future requirements of good-sized tonnage. Basic is less active and is held from $15.50 to $16 valley, although some resale iron has been obtained as low as $15.25 valley. A fair tonnage is under negotiation.

The market for No. 2 foundry is from $15.50 to $16 valley, but the lower price has been slightly shaded in aggressive competition. Furnaces nearby Pittsburg have been booking much of the current business because of delivered price advantage. A small lot of No. 1 for first half brought $16.50 at a furnace on practically the same freight basis as the valleys. In Cleveland territory, 500 tons of No. 2 southern were sold at $13 Birmingham, or $17.35 delivered. One of the largest merchant interests in the south which is in a very comfortable position with respect to booked tonnage is holding on first quarter delivery as follows: No. 1, $13.75, No. 1, soft, $13.50, No. 2, $13 and gray forge, $11.50, all Birmingham basis.

On prompt and first quarter shipment on northern iron, we quote as follows:

Bessemer, valley	$16.50 to 17.00
Bessemer, Pittsburg	17.40 to 17.90
No. 1 foundry, Pittsburg	16.90 to 17.15
No. 2 foundry, Pittsburg	16.25 to 16.90
Gray forge, Pittsburg	15.40 to 15.90
Basic, valley	15.50 to 16.00
Basic, Pittsburg	16.40 to 16.90

Ferro-Alloys.—The current demand for all ferro-alloys is good, and prices in ferro-manganese are stiffening. The aggressive underselling throughout the country of some interests is disappearing. Negotiations are under way on a considerable tonnage at higher levels. We quote 80 per cent ferro-manganese at $44.50 to $45.50 Baltimore, the lower figure applying to prompt shipment with a freight rate of $1.95 to Pittsburg.

Imported 50 per cent ferro-silicon is quoted $64 to $64.50 Pittsburg on forward deliveries; domestic 12 per cent, $28; 11 per cent, $27; 10 per cent, $26, Pittsburg. Imported lower grades of ferro-silicon range lower than domestic.

Plates.—The influence of the recent buying of steel cars by railroad companies is manifesting itself in the plate market, and specifications are being received by the Carnegie Steel Co. and the Jones & Laughlin Steel Co. for the material required. Some plate contracts for extended requirements are being taken. The Pressed Steel Car Co., Pittsburg, has been awarded 160 all steel hopper cars for the Birmingham Southern railway, 250 all steel cars and 25 steel underframe cars for the Newburg & South Shore railroad, both orders being part of the steel car inquiry of the United States Steel Corporation. The contract for the 800 all steel ore cars for the Duluth & Iron Range railroad is yet unclosed. The Steel Corporation has also placed an order with the American Locomotive Co. for a number of locomotives, understood to be 60. The Cambria Steel Co. has been awarded a contract for 500 all steel cars by the Western Maryland railroad. The Pittsburg & Lake Erie railroad has increased its order of 1,000 all steer hopper cars to 1,500 cars with the American Car & Foundry Co., and the steel axles for this entire assortment, it is understood, will go to the Carnegie Steel Co. Small mills continue to shade narrow sizes of plates. We quote official plate prices:

Tank plate, ¼-inch thick, 6¼ to 100 inches, 1.60c f. o. b. mill Pittsburg. Extras are as follows per 100 pounds; Boiler and flange steel plates, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ½-inch to and including 3/16-inch plate on thin edges, 0.10c; under 3/16 to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—Consumers of sheets are showing a greater disposition toward contracting, the manufacturing trade

closing for first half and the jobbers for first quarter delivery. Orders for stock for nearby delivery are light, owing to the end of the year being at hand. Some jobbers, however, are instructing makers to ship for stock after Jan. 1. Shading of sheet prices is less apparent. The leading interest is now operating 84 sheet mills, having started four mills of its Wellsville plant this week. The remaining six mills at this plant will resume as soon as possible. The Canal Dover plant of 11 mills has been closed for repairs and four mills of the Scottdale plant are also idle this week. We quote official prices:

Blue annealed sheets, No. 10 and heavier, 1.80c; Nos. 11 and 12, 1.85c; Nos. 13 and 14, 1.90c; Nos. 15 and 16, 2c; box annealed, Nos. 17 to 21, 2.25c; Nos. 22 to 24, 2.30c; Nos. 25 and 26, 2.35c; No. 27, 2.40c; No. 28, 2.50c; No. 29, 2.60c; No. 30, 2.70c; galvanized sheets, Nos. 10 and 11, 2.45c; Nos. 12 and 14, 2.55c; Nos. 15 and 16, 2.65c; Nos. 17 to 21, 2.80c; Nos. 22 and 24, 2.95c; Nos. 25 and 26, 3.15c; No. 27, 3.35c; No. 28, 3.55c; No. 29, 3.70c; No. 30, 2.95c; corrugated roofing, $1.75 per square for No. 28 painted, 2½-inch corrugation, and $3.10 per square on galvanized roofing, 2½-inch corrugation, No. 28.

Jobbers are allowed $1 a ton from these prices.

Tin Plate.—The salmon packers on the Pacific coast are now well covered for their requirements during the coming year, and are beginning to specify for material for shipment after Jan. 1. The American Can Co., a heavy consumer of tin plate, has started to specify heavily against its contract recently made with the leading interest. The terne plate season is practically ended, and the volume of business closed has been very favorable compared with the conditions that have prevailed as to other tin mill products. The American Sheet & Tin Plate Co. this week started its Sharon plant of 20 mills, but shut down its National plant of 25 mills for repairs, leaving 111 mills in operation and the percentage of activity practically unchanged. Official prices are:

Coke tin plate, 100-pound basis, 14 x 20, $3.70 f. o. b. mill Pittsburg district. Terms, 30 days, less 2 per cent for cash in 10 days.

Rails and Track Material.—The past month brought an increased tonnage in orders to the local rail maker, and greatly advanced the preliminaries for heavy contracting by the railroads for 1909 delivery. Rail mill No. 1, the tonnage mill at the Edgar Thomson works, has resumed operations and sufficient business is at hand to insure more consistent activity. During the week the Carnegie Steel Co. booked several small contracts for standard sections of minor importance, and from 1,200 to 1,400 tons of lights. On present specifications on Bessemer rails, we quote as follows, the base price for open-hearth rails being $30 mill:

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; 8-pound, $36; 12-pound, $32; 16-pound, $30; 20-pound, $29; 25 to 45-pound, $28; angle splice bars for standard sections, $1.65; standard spikes, $1.70 to $1.80 Pittsburg; hand spikes, $1.80 to $1.90 Pittsburg.

Steel.—Specifications against long term billet contracts are especially heavy, and during November a marked increase in the tonnage moved has been made, with some makers reaching as much as 50,000 tons. New business is scattering and not heavy. Sheet and tin bars also show improvement, and are being consumed a little more heavily.

Bessemer and open-hearth billets, base sizes, are quoted at $25 Pittsburg, and forging billets at $27 Pittsburg, subject to the division of the freight charge over $1 and not exceeding $3, and sheet and tin bars at $27.50 Pittsburg, valley and Wheeling territory, and $27 Pittsburg for delivery to other points.

Hoops, Bands and Cotton Ties.—With December, the cotton tie market for the year has practically closed. A comparison of the tonnage booked with that of other years shows a very satisfactory season. Hoop and band contracts are nearing expiration and are expected to be renewed soon. We quote official prices:

Hoops in carload lots, 1.80c; in less than carload lots, 1.90c; bands, 1.40c, base half extras as per standard steel.

Merchant Bars.—A greater buying movement in bar iron has extended throughout November, and the railroads particularly are more active in their consumption. The higher prices held by Pittsburg mills are diverting considerable business to outside makers who are still quoting 1.40c, but some new contracts have been placed at the 1.50c level. The high prices of scrap make probable soon a higher base quotation generally. Present steel bar prices are not likely to undergo any change soon. Steel bars are being ordered more freely, and some trade, notably that of nut and bolt makers, indicates a greater consumption. The Republic Iron & Steel Co. has its general operations at present upon better than an 80 per cent basis, and its bar mill activities are considerable in excess of this percentage. All its rolling mills with the exception of Alabama and Toledo are in operation, and conditions are such that it is not likely the former plant would be run except in highly prosperous periods. The company's steel works have been running steadily since Oct. 12, and all its blast furnaces are in action, though some repairs will shortly be made to at least one of the Hazelton stacks. Shafting quotations at full prices are not attracting much business. We quote official prices as follows:

Common iron bars, 1.50c Pittsburg in carload lots and over; 1.55c in less than carloads; 1.42c to 1.45c base Pittsburg, plus freight to point of shipment on western deliveries; Bessemer and open-hearth steel bars, 1.40c; plow and cultivator, 1.40c; channels, angles, zees, tees, under 3 inch, 1.50c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting, 57 per cent in carloads, and 52 per cent in less than carloads, delivered in base territory; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flats, 1.60c to 1.65c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.10c to 2.15c. Planished and machine straightened tire steel is 1.60c base. Iron finished tire under 1½ by ½ inches, 1.55c, plus ½ extra on tire card; iron finished tire, 1½ by ½ and over, 1.40c, plus ½ extra on the steel bar card.

On cold rolled strip steel, width 1½ inches and wider, and 0.100 inch and thicker, we quote base prices per 100 pounds, $3.35 on hard, and $3.60 on soft.

Structural Material.—Tonnage contracts of structural shapes for extended deliveries in next year are being taken by some of the leading makers. Inquiries in construction projects are fair, extension plans predominating. While sentiment is improved, prices in fabricating lines are slow to show recovery, and this is manifested in the fact that quotations of 2.25c made in the week failed to secure the business. The second opening of bids this week for the joint county bridge at Monongahela City, Pa., 1,500 tons, shows the Fort Pitt Bridge Works the lowest bidder at $226,267. The highest bid was $245,890, that of the Pennsylvania Steel Co., and the remaining five tenders ranged between these figures. At the first opening of bids, the Fort Pitt Bridge Works was also the low bidder at $217,042. The contract has not been awarded. Bids

went in this week for a small tonnage for a laundry building and tunnel for the new Homeopathic hospital, Pittsburg. The Bollinger-Andrews Construction Co. has taken 600 tons for extensive additions to the plant of the Standard Plate Glass Co., at Butler, Pa. We quote official prices as follows:

Beams and channels, 15-inch and under, 1.60c; over 15 inches, 1.70c; zees, 1.60c; tees, 1.65c; angles from 3 to 6 inches, 1.60c; over 6 inches, 1.70c; universal and sheared plates, 6¼ inches and wider, 1.60c base.

Merchant Pipe.—The merchant trade is being very well sustained, but jobbers are not specifying beyond requirements on account of inventories about to be taken. Some oil and gas field goods are moving, but the demand in this respect is not heavy. The Gulf Refining Co. has placed an order for four miles of 6, 8 and 10-inch line pipe. There is also an inquiry out for 30 miles of 6 and 8-inch line pipe for Texas delivery. We quote the following official base discounts with an additional one point and five off to jobbers:

	—Steel—		—Iron—	
	Black.	Galv.	Black.	Galv.
¼ to 6 inches....	75	65	73	63

Boiler Tubes.—While there is a somewhat better demand for both merchant and locomotive tubes, the market still lacks much activity. The increasing use of electricity for power purposes is having some effect on the demand for merchant tubes. There is some shading of prices. We quote the following official base discounts to the general trade on base sizes:

BOILER TUBES.

	Iron.	Steel.
2¼ to 5 inches.....	52	65

Wire Products.—The close of the year at hand with its inventory activities is exerting an effect upon the wire market, and is holding the demand to an even gait. There is a reassured tone to the market, however, and healthy conditions are expected with the coming of the spring trade. The Youngstown Sheet & Tube Co. announces that it is now in position to book orders for staples and galvanized barb wire at its enlarged Struthers works. Official wire prices are as follows:

Wire nails, jobbers' carload lots, $1.95; retailers' carload lots, $2; painted barb wire, jobbers' carload lots, $2.10; retailers' carload lots, $2.15, with 30c for galvanizing; plain wire to jobbers in carloads, 1.80c; and to retailers in carloads, 1.85c.

Wire Rods.—Makers of rods are not inclined to actively seek business at present prices. We quote $33 Pittsburg on Bessemer and $34 Pittsburg on open-hearth rods.

Coke.—Some contracting in furnace coke is still under way and there are several inquiries before sellers, but the main movement for the first half of the new year has been disposed of. A sale of the week called for 5,000 tons a month for first half at about $2.10 ovens. Some full year foundry coke contracts have been made at $2.50 ovens. We quote standard furnace coke on contract at $1.90 to $2.10 ovens, and standard foundry coke on contracts at from $2.25 to $2.50 ovens. Prompt furnace coke holds from $1.75 to $1.85 ovens, and prompt foundry coke from $2.15 to $2.35 ovens, as high as the latter figure having been paid. The water famine in the coke regions has not improved. For the week ending Nov. 21, the *Courier* shows 19.154 ovens in blast, 18,866 ovens out of blast, with a production of 220.145 tons, as against 18,389 active ovens, 19,505 ovens inactive, and an output of 228,190 tons the previous week.

Old Material.—The feature of the week in the scrap market has been the high prices for turnings and borings developed by dealers bidding against each other in an effort to cover on short sales. A steel company quietly entered the market recently and made a large aggregate purchase of turnings and borings for nearby delivery, estimated at upwards of 10,000 tons, at about $10.50 and $11.50 delivered, which was well distributed among dealers, a number of whom sold short. Finding this material comparatively scarce, these short interests have been aggressively bidding against one another until as high as $13.50 has been asked for turnings. For actual consumptive demand, the market for these grades has not changed and prices range as given below. Some dealers are showing a tendency to loosen a little on stocks of heavy steel and as a result offerings are a trifle freer. We quote gross tons delivered in the Pittsburg district as follows:

Heavy melting scrap, $16 to $16.50; re-rolling rails, $17.25 to $17.75; bundled sheet scrap, $13.50 to $14; iron axles, $23 to $23.50; old iron rails, $18.50 to $19; No. 1 wrought scrap, $17.25 to $17.75; old car wheels, $16.25 to $16.75; low phosphorus, $18.50 to $19; machine shop turnings, $11.50 to $12; cast borings, $10.75 to $11.25; No. 1 cast scrap, $14 to $14.50; malleable, $14.25 to $14.75.

CHICAGO.

Large Contracts Not Numerous, but Sales Make a Fair Volume.

Office of THE IRON TRADE REVIEW, 1328 Monadnock Block, Dec. 1.

The more noticeable transactions of large tonnage have been fewer in the past week, but there is a good substantial undercurrent of contracting in general manufacturing lines for moderate requirements that is quite encouraging. The wave of heavy buying of pig iron seems to have passed and the routine demand only remains, to supply which some 10,000 to 15,000 tons of pig iron was sold in this market during the week. Furnace interests locally and in the south express great confidence in the future and this is reflected in what seems to be a very genuine firmness in prices. The movement of billets continues active, specifications on steel bars are in well sustained volume and there has been a better demand for merchant steel. Prices on plates and sheets are more firmly established, particularly for the latter. Structural mills are operating steadily with increasing tonnages on their books, but the letting of structural contracts for building was without feature this week. Contracting for spikes and bolts continues to be the most active phase of railroad buying for track work and over 50,000 kegs were ordered. Some small tonnages of standard section rails were ordered during the week, including 1,200 tons of open-hearth rails, the first to be rolled at the South Works. The American Car & Foundry Co. will build the 1,000 50-ton steel ore cars for the Chicago & Northwestern railroad, and it is understood they will also build some 1,800 box cars for the Harriman lines. The Harriman lines are considering the purchase of 1,500 steel underframe cars, the Northern Pacific has ordered 63 passenger cars from the Barney & Smith Car Co. and will build 1,600 freight cars in its Tacoma shops, and the Chicago, Rock Island & Pacific will buy in the near future 35 Pacific type locomotives and 70 passenger cars.

A very plausible argument has been put forth that the accumulations of stocks of scrap by the dealers in Chicago has for its object a supplying of the prospective demand from the Gary open-hearth steel plant. In the absence of any authoritative statement as to the intended mode of procedure by the Indiana Steel Co., one guess is as good as another and it is our opinion that the open market will not be

by any means a necessary medium between the Gary furnaces and the source of practically all the scrap that is available for purchase. One western railroad, at least, already has a permanent arrangement whereby it disposes of a part of its scrap on an exchange basis with interests supplying it with bar iron, for example. It is hardly probable that the Gary plant, essentially a rail making plant, will be dependent, except perhaps in a very incidental way, upon the local handlers of scrap. It is easily conceivable that the railroads, regardless of their other connections with the United States Steel Corporation, will be glad to extend to the sale of their scrap the same principles and advantages of a steady and uniform market, which apply to their rail purchases. Furthermore, there seems to be no occasion for believing that a policy is to be inaugurated by the Indiana Steel Co. which shall have for its principal or even incidental object the embarrassment of local independent consumers of scrap. It is unreasonable to suppose for the above reason or any other that the steel company would wittingly subject itself to the market fluctuations to which the mere probability of its periodically entering the market as a buyer would give rise. If the policy of the Steel Corporation with regard to how it obtains scrap is to be changed in any particular, because of this changing to the pig and scrap open-hearth method, it is more likely that that change will be with regard to taking old material from railroads direct rather than with regard to buying in an open market controlled by middlemen. It is patent that scrap prices will be higher in Chicago territory, but it is equally clear that more scrap will be diverted to Chicago and it would seem to follow that the large development of a scrap using process for the making of new material will decrease the spread between the value of old and new material and will result in the more rapid turning over of old equipment for replacement.

Pig Iron.—In most quarters, the past week has been a very quiet one in the matter of pig iron. The largest sale reported was for 1,000 tons, but of smaller lots an aggregate of some 10,000 tons was disposed of. An inquiry for 1,500 tons from a manufacturer is noted. Considerable firmness is being displayed by the furnaces with regard to prices despite the proportion of capacity unfilled for the first quarter. In the south, less than $13 cannot be done for first quarter iron, but there is plenty available at that figure. The local market is $17.50 delivered for first quarter, though this price might be shaded on desirable business by an absorption of freight to local plants. Toward extended delivery the attitude is much the same in the north and south. While some southern interests are out of the market for other than first quarter business, in general, other deliveries are obtainable at an advance of 50 cents for the second quarter alone and an advance of 25 cents for delivery through the first half. We quote for first quarter delivery to Chicago plants as follows:

Lake Superior charcoal	$20.00 to 20.50
Northern foundry No. 1	18.00 to 18.50
Northern foundry No. 2	17.50 to 18.00
Northern foundry No. 3	17.00 to 17.50
Southern foundry No. 1	17.85 to 18.35
Southern foundry No. 2	17.35 to 17.85
Southern foundry No. 3	16.85 to 17.35
Southern foundry No. 4	16.35 to 16.85
Southern No. 1 soft	17.85 to 18.35
Southern No. 2 soft	17.35 to 17.85
Southern gray forge	15.60 to 16.10
Southern mottled	15.35 to 15.60
Southern silveries, 4 per cent silicon	18.10 to 18.60
Southern silveries, 5 per cent silicon	18.35 to 18.85
Southern silveries, 6 per cent silicon	18.85 to 19.35
Jackson Co. silveries, 6 per cent.	19.90
Jackson Co. silveries, 8 per cent.	20.40 to 20.90
Jackson Co. silveries, 10 per cent.	21.90
Malleable Bessemer	17.00 to 17.50
Standard Bessemer	17.65 to 18.15
Alabama Basic	17.35 to 17.85

Billets.—The local billet situation is stronger than it has been for many months. Sales of 300 tons of rolling billets, about 1,000 tons of axle billets and several small lots of forging billets are reported. Prices are well maintained. We quote 4 by 4 inch rolling billets, $26.50, and forging billets, $28.50, base, Chicago. We quote f. o. b. Pittsburg, Bessemer wire rods, $33; open-hearth, $34; chain rods, $33.

Merchant Steel.—The volume of steel bar specifications during the present month has reached 15,000 tons. Merchant steel has been in good demand. The Inland Steel Co.'s mills are running well up to capacity with all six of its open-hearth furnaces on. At the South Works, it is understood that the entire open-hearth furnace capacity is ready to be thrown into operation, the structural mill is operating full time, both rail mills are running part of the time, and the sheared and universal plate mills are alternating. Other mill operations are about as last reported. We quote for bar iron and steel in various finished forms as follows:

Bar iron, 1.50c to 1.53c; soft steel bars and bands, 1.58c; half extras, soft steel angles, less than 3 x 3, 1.68c; hoops, 1.98c base, full extras; planished or smooth-finished tire steel, 1.78c; iron finish, up to 1½ x ½-inch, 1.73c base tire card; iron finish, 1½ x ½-inch and larger, 1.58c base steel card; channel for solid rubber tire, ¾ to 1 inch, 2.08c; and 1⅛ inch and larger, 1.98c; smooth finished machinery steel, 1.83c; flat sleigh shoe, 1.63c; concave and convex sleigh shoe, 1.83c; cutter shoe, 2.05c; toe calk steel, 2.13c; railway spring, 1.93c base steel card; vehicle spring steel, 1.98c base vehicle card; crucible tool sheet, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are 56 per cent off the list for carload lots, and 52 per cent off for less than carload lots, carload freight allowed to points in base territory. On iron and steel bars from local stocks, we quote as follows: Bar iron, 1.90c to 2c, full extras; soft steel bars, 1.80c per 100 pounds base, plus half extras; soft steel hoops, 2.30c, full extras.

Plates.—The buying of steel plates is steadily increasing with the tonnage of universal plates being rolled somewhat in the lead. Prices, though considerably firmer, are still subject to some shading. We quote for Chicago delivery:

Plates, ¼-inch and heavier, 6¼ to 100 inches wide, either universal or sheared, 1.78c Chicago. For extras see Pittsburg report. Jobbers' prices for shipment from local stocks are as follows: Tank steel, ¼-inch and heavier, up to 72 inches wide, 2c to 2.10c; from 72 to 96 inches wide, 2.10c to 2.20c; 3/16-inch up to and including 60 inches wide, 2.10c to 2.15c; 72 inches wide, 2.35c to 2.45c; No. 8, up to 60 inches wide, 2.10c to 2.15c. Flange and head quality, 25c extra.

Sheets.—The local situation on sheets is strong with manufacturing capacity well taken care of. The greatest demand is for galvanized with the lighter gages also in greater demand than the heavier sheets. Prices on sheets have stiffened and practically no cutting is reported. We quote store prices Chicago delivery. For mill prices see Pittsburg report.

No. 10, 2.15c to 2.25c; No. 12, 2.20c to 2.30c; No. 14, 2.25c to 2.35c; No. 16, 2.35c to 2.45c; Nos. 18-20, 2.60c to 2.65c; Nos. 22-24, 2.65c to 2.70c; No. 26, 2.70c to 2.75c; No. 27, 2.75c to 2.80c; No. 28, 2.85c to 2.95c; No. 30, 3.25c. Galvanized sheets, No. 10 to 16, 3.05c to 3.10c; Nos. 18 to 20, 3.15c to 3.25c; Nos. 22 to 24, 3.30c to 3.35c; No. 26, 3.50c to 3.55c; No. 27, 3.70c to 3.75c; No. 28, 3.90c to 4.00c; No. 30, 4.40c to 4.50c.

Structural Steel.—Developments in

connection with structural steel projects, which have been interesting fabricators here, have been few. The general contract for the Hart, Shaffner, Marx building is understood to have been given to the Wells Bros. Co., the steel to be fabricated by the American Bridge Co. It was also reported that Wells Bros. Co. had the general contract for the Vendome hotel, but this is unlikely, inasmuch as the drawings for this building are not yet completed and the letting of the contract was not expected by those well informed for a fortnight hence. The plain material to be fabricated for the third open-hearth building at Gary is being ordered by the American Bridge Co. There will be about 10,500 tons in the building. The Wisconsin Steel Co. let the contract for 270 tons of steel for an addition to its mill at South Chicago to the Pittsburg Steel Construction Co. The contract price was $13,000. The new building is for the housing of a cold rolled shafting department. The 4,000-ton railroad viaduct at Denver is expected to go to the Milwaukee Bridge Co., although the contract is not known to have been formally awarded. The Richards, Noelke Iron Works of Indianapolis will fabricate about 1,000 tons for the LaSalle Investment building in St. Louis. The sanitary district is reported as having a bridge contract to award this week in addition to which there is inquiry in the market for about 3,000 tons of bridge steel. Specifications for 500 tons of structurals were received from the Santa Fe. Prices are unchanged and we quote as follows:

Beams and channels, 3 to 15 inches, inclusive, 1.78c to 1.81c delivered Chicago. For extras see Pittsburg report. Quotations from store are as follows for carload lots and over:

All angles, 3 inches and larger, including 6 inches, $1.95 per 100 pounds; angles over 6 inches, $2.05 per 100 pounds, base; beams, 3 to 15 inches, inclusive, $1.95 per 100 pounds, base; channels, 3 inches and larger, $1.95 per 100 pounds, base. Less than carload lots are $1 a ton higher than foregoing prices.

Rails and Track Supplies.—The contracting for spikes and bolts again constituted the most interesting feature of the week in railroad buying for track work. Of the 150,000 kegs of spikes and bolts noted last week as immediately in prospect, there was placed during the past week 20,000 kegs of spikes and 5,000 kegs of bolts for the Chicago, Rock Island & Pacific; 25,000 kegs of spikes and 10,000 kegs of bolts for the Chicago, Milwaukee & St. Paul; 4,000 kegs of spikes for the Mexican railroad, the Yaqui River & Pacific, and specifications for 5,000 kegs. There has been no further inquiry for rails in quantity for 1909, the Burlington inquiry remaining alone. None of the western roads has purchased as yet except in the small quantities reported from time to time. During the week, the financial agent for the state of Texas contracted for 1,100 tons and specifications for a similar amount were received. An interesting order was one for 1,200 tons of open-hearth rails which are to be rolled at the South Works of the Illinois Steel Co. This will be the first lot of open-hearth rails to be rolled at South Chicago. Sales of light rails by the leading interest continue heavy and it is reported that with the exception of southern territory prices are much improved, the maximum concessions from the schedule prices not exceeding $1 a ton. We quote for Chicago delivery as follows:

Standard Bessemer rails, $28; open-hearth, $30, f. o. b. mill in 500-ton lots and over; less than 500 tons, $2 extra, full freight to destination; light rails, 25-pound to 45-pound, $26; 20-pound, $27; 16-pound, $28; 12-pound, $29. Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.60c; spikes, 1.80c to 1.90c; track bolts, with square nuts, 2.15c to 2.25c; with hexagon nuts, 2.30c to 2.40c. Small railroad and square boat spikes, 1.90c base, f. o. b. Chicago.

Merchant Pipe and Boiler Tubes.—The present season includes the ordinarily dull months in the tubular goods trade. A hand to mouth buying on a small scale prevails and not until the middle of February will the trade be expected to show much of an increase in activity. Prices we quote as follows:

	—Steel— Black.	Galv.
¼ to 6 inches, inclusive.....	73.2	63.2
7 to 12 inches, inclusive.....	70.2	55.2

BOILER TUBES.

	Steel.	Iron.	Seamless.
2¼ to 5 in., inclusive....	63.2	50.2	50.2

Cast Iron Pipe.—The cast iron pipe market was quiet throughout the week, the only inquiry of any importance being that of 10,000 tons at Detroit to be let this week. The 3,500 tons which has been twice advertised for letting by that same city is still unplaced, all bids having been rejected a second time. We quote for 4-inch pipe, $27; 6 to 16-inch, $26; larger size, $25; gas pipe, $1 a ton higher.

Wire Products.—The past week has been one of marked activity in all kinds of wire products. Heavy tonnages were placed in plain wire, barb wire, nails and wire rods. The mills of the leading interests are rapidly being put into operation up to their full capacity.

Wire nails, jobbers' carload lots, $1.95; retailers' carload lots, $2; painted barb wire, jobbers' carload lots, $2.10; retailers' carload lots, $2.15, with 30c for galvanizing; plain wire to jobbers in carloads, 1.80c; and to retailers in carloads, 1.85c. Wire rods, Bessemer, $33; open-hearth, $34; chain rods, $33, f. o. b. Pittsburg.

Old Material.—While the advances in scrap prices were not so general or so marked during the week, the tendency was still in an upward direction. Prices paid to the Burlington last week for old material were the highest reported thus far, but consumers are still able to buy material on track which has to be moved, at the minimum prices quoted. For iron car axles $21.50 was paid to a railroad last week. The Chicago & Northwestern is asking prices on a list of 3,700 tons and the Illinois Central on a small list of 350 tons. At this time it seems that the amount of scrap that has been stored in local dealers' yards has been exaggerated by various reports, the estimated quantities exceeding the real amount by 100,000 tons. The tonnage that will be required for the Gary plant in the near future also seems to have been estimated too liberally. It is also interesting to note that what has seemed a notably large accumulation of scrap by the dealers against the background of the present local market seems a mere bagatelle when contrasted with the demand of the Gary plant in full operation. We have revised our prices and quote as follows:

Old car wheels	$15.75 to 16.25
Old iron rails	19.50 to 20.00
Re-rolling rails (4 ft. and over)	17.25 to 17.75
Old steel rails (4 ft. and under)	15.50 to 16.00
Light section relayers, 45 lbs. and under, subject to inspection	21.00 to 23.00
Relaying rails, subject to inspection	19.00 to 19.50
Frogs, switches and guards	15.50 to 16.00
Heavy melting steel	15.25 to 15.75

We quote, net tons, as follows:

No. 1 R. R. wrought	$14.50 to 15.50
No. 2 R. R. wrought	13.50 to 14.00
Knuckles, couplers and springs	14.50 to 15.00
Shafting	16.50 to 17.00
Iron car axles	21.00 to 21.50
Steel car axles	18.50 to 19.00
Dealers' forge No. 1	11.75 to 12.25
Pipes and flues	11.00 to 11.50
No. 1 cast, 150 lbs. and less	14.00 to 14.50
No. 1 mill	9.00 to 9.50
Mixed busheling (Nos. 1 and 2)	9.50 to 10.00
Country sheet	5.50 to 6.00
No. 1 boiler cut	10.50 to 11.00

Boiler punchings	12.50 to 13.00
Cast borings	8.00 to 8.50
Mixed borings, etc.	8.00 to 8.50
Machine shop turnings	9.00 to 9.50
Railroad malleable	14.00 to 14.50
Agricultural malleable	12.00 to 12.50
Stove plate and light cast scrap	12.25 to 12.75
Old iron splice bars	17.50 to 18.00

CLEVELAND.

Closing in an Unprofitable Lake Season—More Vessels Ordered.

Office of THE IRON TRADE REVIEW, Browning Bldg., Dec. 1.

Iron Ore.—The Pittsburg Steamship Co. has finished shipments for the season and laid up all its boats for the winter. The season is closed at Duluth and Two Harbors, but a small tonnage of ore is yet to be shipped by independents from Ashland, Marquette and Escanaba. The season now rapidly drawing to a close has been one of the worst in the history of the lake trade for independent vessels as not more than 60 per cent of them have made even a fair profit. It is expected that the statistics of ore on dock Dec. 1 will show the largest tonnage ever on docks. Buying of ore is practically ended. On base ores, with the guarantee of 55 per cent on old range and Mesabi Bessemer and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer, $4.25; old range Bessemer, $3.70; old range non-Bessemer, $3.50.

Pig Iron.—The lull in pig iron buying continues, and there seems to be very little prospect of early resumption, as buyers are well covered for at least the first quarter of the year, and are not attempting, at present prices, to buy for later delivery. We note the sale of somewhat less than 1,000 tons of malleable at $16 valley. Cleveland furnaces are firm with their prices and are quoting $17 for delivery outside of the city and $17.25 for iron delivered to Cleveland plants. For delivery in Cleveland we quote as follows:

Bessemer	$16.90 to 17.90
No. 1 foundry	17.50 to 17.75
No. 2 foundry	17.00 to 17.25
No. 3 foundry	16.50 to 17.00
No. 2 southern	16.85 to 17.35
Gray forge	15.00 to 16.00
Lake Superior charcoal	19.50 to 20.00
Jackson Co. 8 per cent silvery	20.05

Coke.—There is not much activity, but prices are well maintained. We quote spot furnace coke at $1.80 to $1.90, and on contracts $2. Foundry coke we quote at $2.25 for prompt delivery and $2.35 to $2.50 on contracts.

Finished Material.—The placing of additional orders for lake vessels has resulted in the contracting for a good tonnage of plates and shapes, divided between the principal producer and independent interests. The American Ship Building Co. closed a contract for a big freighter with independent furnace interests east of Buffalo, and for a freighter to be operated by the Michigan Alkali Co. between Alpena and Wyandotte. The Northern Navigation Co. has closed a contract with the Collingwood Ship Building Co. for a passenger steamer, and the Great Lakes Engineering Works has contracted for four steel lighters, and for a passenger boat to be run between Sandusky and Cedar Point. Not including the lighters, 13 boats have been contracted for within the past six weeks. The principal interest reports that specifications in nearly all lines are coming in freely, but some of the independent companies complain that business is very dull. The demand for light rails is fair and a contract for 3,000 tons of standard sections was closed the latter part of the past week by the leading interest. Buyers are showing more disposition to urge prompt shipment. Some companies will not promise steel bars in less than three to four weeks. The bar iron situation is very unsatisfactory. Prices of scrap continue high, and the Empire Rolling Mill Co., rather than buy scrap at present high prices, has closed its plant. In making quotations, very little attention is paid to the Pittsburg base, each mill being a law unto itself. Cleveland mills are quoting 1.50c, this city, but sales cannot be made at this figure.

Old Material.—Another advance of 50 cents a ton was recorded in several classes of steel material during the past week. Somewhat of a feature of the local market has been the withdrawal of prices on some hundreds of tons of old iron rails which have appeared in this market after having been replaced by steel rails by a New York-Chicago railroad. An advance in prices followed the formal withdrawal, and holders expect even higher prices. This is still a "dealers' market," and rolling mills are not buying in large quantities as yet. We quote, f. o. b. Cleveland, as follows:

Old iron rails	$19.00 to 19.50
Old steel rails (re-rolling)	17.00 to 17.50
Old steel rails (under 6 ft.)	17.00 to 17.50
Old car wheels	15.50 to 16.00
Old steel boiler plate	13.50 to 14.00
Steel axles	19.50 to 20.00
Malleable iron (railroad)	14.50 to 15.00
Malleable iron (agricultural)	13.50 to 14.00
Heavy steel	15.75 to 16.25
Country mixed steel	13.50 to 14.00
Low phosphorus	17.00 to 17.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$15.50 to 16.00
No. 1 busheling	13.50 to 14.00
No. 1 machine cast	13.50 to 14.00
Iron axles	19.00 to 19.50
Axle turnings	11.00 to 11.50
Machine shop turnings	9.50 to 10.00
Grate bars	12.00 to 12.50
Pipes and flues	12.50 to 13.00
Tank iron	12.50 to 13.00
Hoop and band iron	9.25 to 9.75
Sheet iron	8.50 to 9.00
Wrought drillings	9.50 to 10.00
Stove plate	12.50 to 13.00
Cast borings	8.50 to 9.00

NEW YORK.

Equitable Building and Other Large Projects Under Consideration.

Office of THE IRON TRADE REVIEW, Room 1005, No. 90 West St., Dec. 1.

Pig Iron.—The month opens with the local market comparatively inactive. For the most part, the heavier consumers have taken on as much iron as they care to for the immediate future, and as furnace interests are comfortably filled with orders and are not pressing to sell, it is probable that the situation will remain quiet until after the first of the year. Except for a small tonnage under negotiation in the Philadelphia field, there is little activity in basic. Moderate malleable sales are being made in the New England field, but the bulk of current business is in foundry irons, of which numerous orders for small tonnages are being received. A considerable lot of Virginia iron has recently been placed in the New England field. Prices remain firm, with occasional advances, and the outlook is for a strong market, as additions to operating capacity are few and there is considerable iron yet to be purchased. We quote, New York tidewater delivery during the first quarter, as follows:

Northern foundry No. 1	$17.50 to 18.00
No. 2X foundry	17.00 to 17.50
No. 2 plain	16.25 to 16.75
No. 2 southern foundry	17.25 to 17.75
Malleable	17.50 to 18.00
Basic	16.00 to 16.50
Gray forge	16.00 to 16.50

Ferro-Alloys.—A few sales of ferromanganese, involving moderate tonnages, have been reported during the past week, and there is a good tonnage under negotiation. Prices have firmed up considerably, the current level for advanced delivery being $45, seaboard. The tendency is upward. Ferro-silicon is quiet at unchanged prices.

Finished Materials.—Of chief interest in the structural field is the announcement that figures are now being prepared on the general contract for the Equitable building, and it now appears that the project will be carried to completion. The steel tonnage involved in this structure will run close to 50,000. Another large project

now being figured on is an armory for Richmond, Va., and it is probable that before a great while the Gimbel store addition at Philadelphia, calling for 12,000 tons of steel, will reach a definite stage. Bids are being received on about 8,500 tons of bridge materials for the Northern Pacific, and the Denver viaduct, 3,000 tons, will soon be let. Bids have gone in on a 1,000-ton building for Seattle, and are being prepared on a hotel at Nashville, calling for 900 tons.

In point of actual lettings the local market has been quiet during the week, activity centering in the settlement of a few old projects, and not many new projects are developing. The Hay Foundry & Iron Works will supply the steel, 1,300 tons, for a loft building at 1780 Broadway; an apartment house uptown, requiring 550 tons, went to the receivers of Milliken Bros.; 1,100 tons for a cement plant at Alsen, N. Y., will be supplied by the Cambria Steel Co.; the Eastern Steel Co. took a 600-ton apartment house in Gramercy Park; the Cornell interests secured the steel work for the Flanagan, Nay & Co. brewery additions; and the American Bridge Co. booked 2,000 tons of bridge materials to cover the 1909 requirements of the Delaware, Lackawanna & Western. The Stewart building at San Francisco, 300 tons, went to a local fabricator. The New England Structural Co. secured the 1,800-ton bank building at Boston, and the McClintic-Marshall Construction Co., a 400-ton school building at Philadelphia. The Belmont Iron Works took a 300-ton power plant at Scranton and the Carlin Construction Co. was low bidder on the general contract for the Bellevue hospital plant, requiring 500 tons. The Solvay Process Co., Syracuse, has placed contracts for a building requiring 1,500 tons.

A fair volume of railroad orders is reported. The Pressed Steel Car Co. is at work on the Clinchfield order, taken in October, for 2,350 cars, practically all being steel throughout. This interest has also booked 1,000 steel hopper cars for the Grand Trunk, and 275 all-steel cars for the American Steel & Wire Co. The Western Maryland order for 500 cars went to the Cambria Steel Co. The Virginian Railroad is soon to close on 1,500 cars, and the Delaware, Lackawanna & Western is in the market for 500 box cars and 300 hoppers. Rail orders placed during the week include 13,000 tons for the Central of New Jersey, 6,000 with the Bethlehem Steel Co., and 7,000 with the Pennsylvania Steel Co.

In finished and semi-finished steel a fair activity is noted, prices continuing at the following level for New York delivery:

Angles, 3 to 6 inches x ¼-inch and heavier, 1.76c; beams, 3 to 15 inches, 1.76c; tees, 3 x ¼-inch and heavier, 1.81c; plates, carloads, tanks, 1.76c; marine boilers, 2.16c; bar iron, 1.46c to 1.56c; soft steel bars, 1.56c; sheets, No. 28, black, 2.66c.

Old Materials.—Prices are higher on a number of important lines, but the market locally is without particular interest. The month just ended has been extremely quiet, trading being confined to small lots, except here and there brokers who had sold short were covering their needs. Mills are still taking on scrap very sparingly. We quote gross tons, New York delivery, as follows:

Old steel rails, re-rolling	$14.50 to 15.00
Relaying rails	20.50 to 21.50
Old car wheels	13.50 to 14.00
Old iron car axles	19.50 to 20.00
Old steel car axles	18.00 to 19.00
Heavy melting steel	13.00 to 13.50
No. 1 railroad wrought	15.50 to 16.00
Iron track scrap	13.50 to 14.00
Wrought pipe	11.50 to 12.00
Cast borings	9.00 to 9.50
Wrought turnings	10.50 to 11.00
Heavy cast scrap	13.00 to 13.50
Railroad malleable	13.00 to 13.50
Stove plate	10.50 to 11.00
Grate bars	10.50 to 11.00

CINCINNATI.

Inquiry and Sales Light—Beginning of a Quiet Period.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., Dec. 1.

Pig Iron.—Inquiry and sales have been comparatively light the past week in this territory, although some of the Cincinnati agencies are figuring on some eastern business involving fairly liberal tonnages. The inquiry, which it was expected would develop into a purchase by a southern Ohio melter, last week, terminated in the buyer deciding to postpone purchasing. The inquiry is now confined to rather limited specifications for forward delivery and there have been some requests for quotations extending into the third quarter of next year. There is but little demand for prompt shipment iron, as consumers' present needs seem to be supplied and there is hardly enough buying for prompt shipment to establish prices. This applies especially to southern iron. The quotation of $13.00 Birmingham for No. 2 foundry for the first half of next year is well established and one sale of 600 tons is reported on this basis, but for the remainder of this year it is believed that $12.50 could be done on some speculative iron. So far as can be learned, however, furnace interests are not willing to quote less than $13.00 Birmingham. In southern Ohio the market appears to be $15.50 at furnace for No. 2 foundry for either prompt shipment or the first half of next year, but some furnaces are asking $16.00 and firmly adhering to this price. Buyers are fairly well covered for the first quarter of next year and, since the advance in prices appear to be complacent as to their future probable needs and seem disposed to wait developments in their demand before making further commitments. Little is therefore expected of the market in the near future, as furnaces have enough orders to keep them from weakening and buyers have bought sufficiently to cover their requirements for a time. The situation appears to have arrived at one of those periods of inactivity which usually follows a buying movement. We quote, for prompt shipment and for the rest of this year, delivered Cincinnati, based on freight rates of $3.25 from Birmingham and $1.10 from Ironton, as follows.

Southern foundry No. 1	$16.75 to 17.25
Southern foundry No. 2	16.25 to 16.75
Southern foundry No. 3	15.75 to 16.25
Southern foundry No. 4	15.25 to 15.75
Southern No. 1 soft	16.75 to 17.25
Southern No. 2 soft	16.25 to 16.75
Southern gray forge	14.75 to 15.25
Northern No. 1 foundry	17.10 to 17.60
Northern No. 2 foundry	16.60 to 17.10
Northern No. 3 foundry	16.10 to 16.60
Northern .8 per cent silicon	19.60

Finished Material.—There is a moderate jobbing demand at unchanged prices. Mill orders are only fair. There is some intimation of strengthening values in bar iron, which is attributed to the firmness in scrap iron. Jobbers fill small orders here at the following prices:

Iron and steel bars, 1.85c to 2c, full extras. Angles, 3 x 3 and over, 2.10c to 2.25c; beams and channels, 15 inches and under, 2.10c to 2.25c; small angles and architectural channels, 2c base; plates, ¼-inch and heavier, 2c; 3/16-inch, 2.10c; No. 8, 2.15c; sheets, blue annealed, No. 10, 2.15c to 2.25c; No. 12, 2.20c to 2.30c; No. 14, 2.25c to 2.35c; No. 16, 2.35c to 2.45c; box annealed sheets, Nos. 18 and 20, 2.55c to 2.65c; Nos. 22 and 24, 2.65c to 2.75c; Nos. 25 and 26, 2.70c and 2.80c; No. 27, 2.75c to 2.85c; and No. 28, 2.85c to 2.95c; boiler tubes, 2¼ to 5 inches, 62 per cent off base; turnbuckles, 45 per cent off, rivets, 3c base; cold rolled shafting, 47 to 50 per cent off list; steel wire, 2.05c to 2.10c base.

Coke.—Considerable furnace coke has been sold recently and a number of the furnaces have bought for the first six months and some for the entire twelve months of next year. This

has resulted in a rather firm tone to the market on furnace coke contracts. Foundries continue to depend on old contracts for their current supplies and do not seem to be interested in contracts for next year. The spot market for foundry coke is rather quiet, but steady. We quote for next year's delivery on contracts in the leading coke producing districts as follows:

	PER TON.
Wise county furnace coke	$1.90
Wise county foundry coke	2.25 to 2.35
Pocahontas furnace coke	1.85 to 2.00
Pocahontas foundry coke	2.00 to 2.25
Standard Connellsville furnace coke	2.00 to 2.25
Standard Connellsville foundry coke	2.35 to 2.50

Old Material.—The market rules firm, as dealers seem inclined to hold their stocks at full prices and are bidding relatively strong figures for such scrap as is offering. Prices for heavy melting steel are particularly firm. We quote dealer's prices to consumers here.

Old No. 1 R. R. wrought, net tons	$14.50 to 15.00
No. 1 machinery, net tons	13.50 to 14.00
Old iron rails, gross tons	18.00 to 18.50
Old steel rails (re-rolling) gross tons	16.50 to 17.00
Old short lengths, gross tons	16.50 to 17.00
Old iron axles, net tons	17.00 to 18.00
Heavy melting scrap, gross tons	15.50 to 16.00
Stove plate, net tons	11.00 to 11.50
Wrought turnings	7.50 to 8.00
Cast borings, net tons	6.00 to 7.00
Car wheels, gross tons	15.00 to 15.50

PHILADELPHIA.

Numerous Orders, But Tonnage Light—The Steel Rail Coontroversy.

Office of THE IRON TRADE REVIEW,
408 Central Trust Bldg., Dec. 1.

Pig Iron.—The market continues its strong, vigorous tone, with the recent advance being firmly maintained, but the buying movement is smaller than for some weeks past, owing chiefly to the fact that leading consumers have covered their prospective requirements to as great an extent as they desire for the present. Inquiries and orders are still plentiful, but the tonnage involved is not heavy. Activity has shifted largely to foundry iron. No important basic sales are reported, though about 20,000 tons are under negotiation and will probably be closed during the current week. Some selling of charcoal iron has been done, one sale being of 500 tons. Makers of the more desirable irons are inclined to discourage buying for advanced delivery and current business is practically all for first quarter. There is little of the speculative, however, in this buying, as nearly as can be learned, for instance, the basic purchasers have covered only about three-fifths of their prospective requirements for the period in which delivery is specified. Occasionally word comes of a small advance here and there, but generally the price level continues as last week, quotations for first quarter delivery at Eastern Pennsylvania plants being as follows:

No. 1X foundry	$17.50 to 18.00
No. 2X foundry	17.00 to 17.50
No. 2 plain	16.50 to 17.00
Standard gray forge	15.75 to 16 25
Basic	16.50 to 17.00
Low phosphorus	21.00 to 21.50
No. 2 Birmingham	17.75 to 18.25
No. 2X Virginia	17.00 to 17.50
No. 2 plain Virginia	16.50 to 17.00

Finished Materials. — Encouraging prospects prevail in the railroad situation. The Pennsylvania Steel Co. has taken an order for 7,000 tons of standard sections for the Central of New Jersey, and the Cambria Steel Co. secured the order of the Western Maryland for 500 steel cars. There is reason to believe that the long drawn out contest over specifications for the Pennsylvania railroad steel rails has substantially been settled and that the 1909 rail orders for this line and for the other systems whose actions are largely influenced by its course of procedure will be forthcoming before the close of the year. This settlement, it is understood, involves no recession on the part of the rail makers, but will provide for the production of the superior quality of rail demanded upon the condition that a better price be paid to cover the additional expense of ore selection, heavier cropping, more stringent inspection, etc. The structural market locally has yielded little during the week, and the Curtis building is not yet in definite shape. There has been good selling of billets and bars, with considerable doing in the way of long-time contracting. Steel selling interests generally report the heaviest month's business in the past year. An early advance in bar iron would not be surprising. We quote: Structural, 1.75c to 1.90c; plates, 1.75c to 1.80c; refined bar iron, 1.45c to 1.50c; steel bars, 1.55c.

Old Material.—There has been a general advance, with considerable buying by steel mills and foundries and, on a more limited scale, by rolling mills, which are now having difficulty securing a new dollar for an old one, with scrap at its present level. The feature of the week's business has been the purchase by the Baldwin Locomotive Works of 3,000 tons of machinery cast scrap at $16, delivered. Some fairly good tonnages of heavy steel have also been closed. The market is strong, and the tendency is decidedly upward. We quote, Eastern Pennsylvania delivery, as follows:

Old steel rails (re-rolling)	$17.50 to 18.00
No. 1 steel scrap	16.50 to 17.00
Old steel axles	22.00 to 23.00
Old iron axles	25.00 to 26 00
Old iron rails	21.00 to 22.00
Old car wheels	16.00 to 16 50
Choice scrap R. R. No. 1 wrought	19 50 to 20.00
No. 1 yard scrap	17.00 to 17.25
Machinery scrap	15.75 to 16.25
Low phosphorus scrap	18.50 to 19.00
Wrought iron pipe	15.00 to 15.50
No. 1 forge fire scrap	14.75 to 15.25
No. 2 forge fire scrap, ordinary	10.00 to 10.50
Wrought turnings	13.50 to 14.00
Axle turnings, heavy	14.00 to 14.50
Cast borings	12.50 to 13.00
Stove plates	13.00 to 13.50

ST. LOUIS.

Not Many Pig Iron Orders Placed, But Prices Are Firm.

Nov. 30.

Pig Iron.—There was not much pig iron business placed last week, probably, the dealers say, because of the approach of the holidays, but prices are still firm with some furnaces entirely out of the market for this year's delivery and an advance of from 25 to 50 cents is asked for delivery next year. Southern No. 2 iron is firm at $13, Birmingham, for December delivery, with $13 to $13.50 quoted for shipment over the first quarter and half of 1909. The Birmingham Coal & Iron Co. is entirely out of the market. Orders aggregating from 2,500 to 3,000 tons, all grades, were placed during the last few days for shipment up to April 1. There are some inquiries out, but not for large tonnage, and it is hardly thought that a buying movement will begin in earnest until after the turn of the year.

Our prices, delivered, to which the freight of $3.75 from Birmingham has been added, follow.

No. 1 southern	$17.25 to 17.75
No. 2 southern	16.75 to 17.25
No. 3 southern	16.25 to 16.75
No. 4 southern	15.75 to 16.25

Coke.—The market for coke is strong, and some of the ovens are holding out for an advance. A price of $2.25 is considered low for the best-selected 72-hour Connellsville foundry coke, and $2.40 to $2.75, ovens, is asked for this grade for immediate and future shipments. Furnace coke, 48-hour, Connellsville, is held at $2 to $2.25. Virginia and West Virginia foundry is quoted at $2.50, ovens. The freight to East St. Louis and St. Louis is $2.80 from Connellsville and the Virginia fields, and $2.70 from the Virginia fields when shipment is destined beyond St. Louis.

Old Material.—There is a fair buying movement for scrap iron in the St. Louis territory, with advances in some lines. Our quotations follow:

Cast iron borings, free from foreign material, net tons	$ 6.00
Steel axle turnings, gross tons	12.25
Steel railroad axles, net ton	17.50 to 18.50
Iron railroad axles, net ton	19.00 to 20.00
Miscellaneous steel scrap, gross ton	12.25
Old car wheels, gross ton	16.00
No. 1 railroad cast scrap, net ton	12.00 to 12.50
Heavy machinery cast, net ton	13.00
Stove plate and light cast, net ton	11.50
Sheet iron, net tons, uncut	5.00
No. 1 railroad wrought, net ton	12.00 to 13.00
Railroad malleable, net ton	11.50
Heavy melting steel, net ton	11.50 to 12.00
Relaying rails, net ton	14.00 to 15.00

BUFFALO.

Good Demand For Spot Pig Iron—Prices Firm.

Office of THE IRON TRADE REVIEW,
932 Ellicott Square, Dec. 1.

Pig Iron.—Market conditions have undergone no particular change the past week and prices hold up to last week's quotations. Spot iron continues selling as before, the demand remaining fairly strong on account of advanced prices for next year's delivery. So far as could be learned today, no large inquiries are in the market. We quote f. o. b. Buffalo as follows:

No. 1X foundry	$16.00 to 16.50
No. 2X foundry	15.00 to 15.25
No. 2 plain	15.00 to 15.50
No. 3 foundry	15.00 to 15.25
Malleable Bessemer	16.50 to 17.00
Gray forge	14.75 to 15.25
Charcoal	20.25 to 20.75

Finished Products.—No great activity is found in finished products. There is figuring on the proposed administration and postoffice building at Chautauqua, N. Y., involving 200 tons of structural. General contractors expected this work, but it is now stated that the corporation which operates the Chautauqua grounds will handle the project. On Dec. 3, New York state will open bids for the structural steel needed in two proposed lift bridges at Rochester, N. Y. From 750 to 1,000 tons will be used. Canadian interests are in this market for 3,000 tons of sheet bars, delivery, first half, 1909. The Canadian General Electric Co. is still looking for quotations on 1,800 tons of acid open-hearth steel. This inquiry has been in the market for several weeks and word comes across the border that the tonnage will not be taken at prices already quoted.

SEATTLE.

Gradual Increase of Foundry Melts Improves Pig Iron Demand.

Office of THE IRON TRADE REVIEW,
302 Pioneer Bldg., Seattle, Wash., Nov. 28.

Pig Iron.—While the demand for pig iron is being stimulated by a gradually increasing foundry melt, it is yet far below normal. Fair and steady progress is being made, however, and the market is in better condition than for some time past. A ship load of 1,000 tons of English No. 1 is expected in Seattle this week, which will relieve the local shortage of iron in stock. Prices are firm, but have not changed any since the last report. We continue to quote:

English soft, No. 1, spot	$26.00 to 26.50
English soft No. 1 to arrive April-May	22.50 to 22.75
Glengarnock No. 1, spot	28.00 to 29.00
Southern soft, No. 2	26.20 to 26.70

Old Material.—The demand for good foundry scrap is improving and prices are generally stiffer than for some weeks past. The market is, however, in a somewhat mixed condition and it is possible to obtain carloads at less than current prices, as is indicated by two carloads of foundry and machinery scrap that recently went to an Oregon foundry at $15, about $2 under the presem normal market price. We continue to quote:

Foundry and machinery scrap	$16.50 to 18.00
Old steel rails	8.00 to 9.50
Railroad wrought	10.00 to 11.00
Country wrought and busheling	5.00 to 7.00

Merchant Iron.—Local rolling mills are operating on somewhat better schedules and the movement of merchant bar and rods continues brisk. Logging and lumber interests are contracting much more freely than for some time past. Prices are firm with a tendency to rise. We quote base prices per 100 pounds f. o. b. Seattle: Common iron bars, $2.25; soft steel bars, $2.35; machinery steel, $2.75; Norway iron, $3.50; angles, channels, zees and tees, under 3-inch, $2.75.

BIRMINGHAM, ALA.

Two Large Concerns Withdraw From the Pig Iron Market.

Dec. 1.

The withdrawal of two of the larger pig iron concerns in the southern territory from the market intimating that the aggregate of the business already booked for delivery during the first quarter of the coming year will carefully protect the probable make, is most significant. There are some companies in this district still selling iron, however, for delivery during January, February and March and are quoting strongly at $13 per ton, No. 2 foundry. The statement has been made that some iron has been sold already in this district, practically immediate delivery offered if desired, at $13.50 per ton, No. 2 foundry, and this price promises to be the general quotation shortly. There is but little business being transacted for delivery during the second quarter of the coming year.

The make in this district shows very little difference, one furnace having blown out for repairs. Two furnaces are on the calendar for resumption of operation within a week or so and by the middle of the month two other iron makers will be started up in this district. The preparations for a better make to meet the probable demand will cease only when conditions warrant it. The fall of rain for a few days will mean plenty of water in the vicinity of the Russellville brown ore mines and as a consequence the washers can be supplied, more ore produced and a furnace which is ready for the torch (Sloss-Sheffield Steel & Iron Co.) can be started up.

BRITISH IRON MARKET.

Improvement Confined Almost Entirely of Pig Iron.

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, England, Nov. 21.

There is little change to report this week, the slightly better tone of a week ago being maintained in some branches of trade. The Cleveland market has shown considerable fluctuation during the week and warrants closed yesterday at 48s 11d ($11.98), compared with 50s 11½d ($12.47) the figure of a week ago. The quotation for Cleveland No. 3 yesterday was 49s ($12), being a reduction on the week of 6d. The hematite trade is rather slow, but buyers are placing their orders more for forward than for prompt delivery. The present stocks aggregate 97,644 tons, which is almost exactly the same as this time last year. Hematite East Coast is higher by 2 shillings per ton. The shipments this month have totaled 65,490 tons as compared with 59,270 last month. Locally, conditions are a little disappointing. Such improvement as there is may be said to be confined to pig iron, of which increasing quantities are being disposed of. But purchases are largely speculative. The maintenance of cheerful American reports is not without influence here. Generally last week's prices were maintained at Thursday's meeting of the local iron trade, but here and there smelters are able to obtain trifling advances.

METAL MARKET

NEW YORK.

Dec. 1.

Copper.—The market has been fairly quiet during the past week, with transactions largely at the figure offered by the consumers, and the situation is now weak, although the decline has apparently been stopped. We quote: Lake, 14⅜c to 14½c; electrolytic, 14⅛c to 14⅜c; casting, 14c to 14⅛c.

Pig Tin.—In sympathy with a stronger tone abroad, the local situation has firmed up considerably, but transactions are of small proportions and there is little interest in the market. The price range is 29¾c to 30c.

Pig Lead.—Consumers are keeping out of the market and the price has sagged as a result. We quote, New York delivery, 4.25c to 4.30c.

Spelter.—The market continues the better feeling noted a week ago, and sales are of good size. The price remains unchanged, 5.10c to 5.15c, New York.

Antimony.—We quote: Cookson's, 8c to 8¼c; Hallett's, 8c to 8⅛c; ordinary brands, 7¾c to 8c.

CHICAGO.

Dec. 1.

While there has been comparatively little buying for future delivery this week, the spot demand has been fairly good. Both lead and tin have declined slightly in price but generally the market has been stationary. We quote as follows:

Lake copper, carload lots, 14¾c to 15c; casting, carload lots, 14½c; pig tin, 32c to 32½c; spelter, 5.00c to 5.25c; pig lead, desilverized, 4.45c to 4.50c in 50-ton lots; corroding, 4.85c to 4.95c in 50-ton lots; car lots, 2½c per 100 pounds higher; sheet zinc, 7c, list f. o. b. La Salle in car lots of 600-pound flasks; Cookson's antimony, 10½c to 11c; other grades, 10c.

We have revised our prices on old metals and quote to dealers as follows:

Copper wire, 13c; heavy copper, 13c; light copper, 11¾c; heavy red brass, 12c; heavy yellow brass, 9c; light brass, 7c; No. 1 red brass borings, 9½c; No. 1 yellow brass borings, 8¼c; brass clippings, 9c; tea lead, 3½c; lead scrap, 3¾c; zinc, 3.25c; tin plate, 25c; tin foil, 24c; pewter, 17c; electrotype plates, free from wood, 4⅛c; electrotype dross, 2⅞c; stereotype plates, 4½c; stereotype dross, 3c; prime slab zinc dross, $55 per ton.

ST. LOUIS.

Nov. 30.

Lead and Zinc.—One bin of zinc ore was sold from the Carbondale mine in Webb City last week on an assay base price of $42, making the record for the year. The ore probably will average 63 per cent, making the amount received for it about $45 a ton. Some ore was sold in the Missouri-Kansas district for $40 and $42, making the prevailing price $41.

Many operators are holding out for a $45 base, but there is not much trouble experienced by the buyers in securing their wants at the prevailing quotations. There is a strong belief that the market will be higher this week because of the large decrease in surplus ore.

There was less demand for lead than during the previous week, and not a great deal of this metal was sold, the producers of lead retaining their ore, whenever possible, with the hope of obtaining higher price soon.

Silicate was reported at $19 base, the highest price being $25.

LABOR SHORTAGE

And Drouth Interfere With Operation of Coke Ovens.

A scarcity of miners is interfering with full operations in some Pennsylvania coke plants, particularly in the Klondyke regions, according to the latest bulletin of the Coke Producers' Association, issued through its secretary, Geo. B. Irvin, Uniontown, Pa. The review of the coke situation for the week ending Nov. 21 is as follows:

While there was an increase of 759 in the active ovens at the close of the week ending Nov. 21, production of coke, by reason of the Frick Coke Co. working but five days at a number, if not all, their plants, was probably somewhat less than the week preceding.

We have reports of the operations of 37,508 ovens last week, of which 20,170 were in blast and 17,338 were idle.

The Frick Coke Co. operated approximately 49.5 per cent of its available ovens five days, a gain of about 2.4 per cent over the week before. There was no change in the operations of the Oliver and Snyder and the Cochran ovens. The W. J. Rainey Co. had 45.5 per cent of its ovens going, a gain of 2.1 per cent, and the other independent ovens had 59.3 per cent in blast, a gain of 1.1 per cent over the week before.

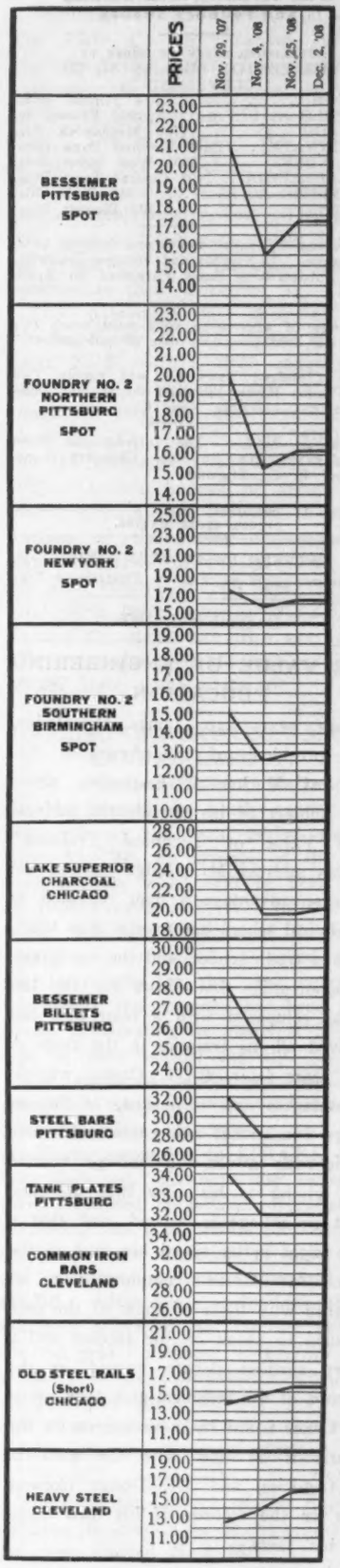
On the whole, while the independent companies averaged about five and one-half days for the week, there was but little, if any, improvement in production.

Some improvement, particularly in the north end of the region, in the water supply is reported. A number of wells have been drilled and others cleaned out and put into use, affording a limited supply. Those of the plants in the south end, with the exception of the Sackett Coke Co., which has completed and put into service a two-mile pipe line from George creek to its plant, which have been short of water during the drouth, are still unable to work full. The labor situation is about the same. A scarcity of miners, particularly in the "Klondyke" region, interferes with a number of the plants operating as fully as they otherwise would if a sufficient number of miners could be had.

Prices continue stronger and the operators are receiving numerous inquiries for coke. Spot coke is scarce.

Reports of operations of 168 blast furnaces getting their fuel supply mostly from this region show at the close of the week 102 in blast and 66 out.

PRICE CHART.



THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades

PUBLISHED EVERY THURSDAY BY
THE PENTON PUBLISHING CO.
CLEVELAND.

BOSTON.....73-74 Journal Bldg.
BUFFALO.....932 Ellicott Sq.
CHICAGO.....1328 Monadnock Blk.
CINCINNATI.....First National Bank Bldg.
NEW YORK.....1005 West Street Bldg.
PHILADELPHIA.....408 Central Trust Bldg.
PITTSBURG.....510 Park Bldg.
SEATTLE.....302 Pioneer Bldg.

Subscription, United States and Mexico, $3.00 per annum. To Canada and Foreign Countries, $4.50. Advertising Rates Furnished on Application.

Change of advertising copy must reach this office ten days preceding date of publication.

The Cleveland News Co. will supply THE IRON TRADE REVIEW through the regular channels of the American News Co.

European Agents: The International News Company, Breams Building, Chancery Lane, London, E. C., England.

ENTERED AT THE POST OFFICE AT CLEVELAND AS SECOND CLASS MATTER.

PRINTED IN AN OPEN SHOP.

COPYRIGHT 1908 BY PENTON PUBLISHING CO.

December 3, 1908.

THE VALUE OF ENGINEERING EDUCATION.

Some years ago, James M. Dodge, then president of the American Society of Mechanical Engineers, chose as a subject of his presidential address "The Value of Technical Training." In this address Mr. Dodge showed the immense advantage a man educated in a technical school has over a man trained in a trade school, and the far greater opportunity that exists for the latter as compared with a man who has received all his training in the shop. A few years later, R. T. Crane, who is something of an iconoclast, as far as things educational are concerned, made a vigorous attack on college trained men, giving as his view that the time spent in college is wasted, and that a man might better spend his time in the shop. Mr. Crane's opinions were at variance with those of most of the men qualified to speak on the subject and a rather spirited debate ensued in the columns of the technical and daily press. Mr. Crane based his assumptions on the experience he had with the men in his factories, and Mr. Dodge likewise drew on the records of his own shops for his facts.

A most valuable addition to the litterature on this subject has now been made in the shape of Prof. Furman's paper on the careers of mechanical engineering graduates, reprinted on page 893 of our Nov. 26 issue. The paper presents facts which will prove unanswerable arguments against Mr. Crane's contentions. Based on the records of all the graduates of one of the foremost technical schools in the country, it shows that but a very small percentage of the over 1,000 men considered can be called failures. While the majority of them fill minor positions during the first few years out of college, the great majority after 5 or 10 years, advance to positions of the highest responsibility and demanding the first grade of executive ability. The paper conclusively shows that technical training not only makes good engineers, but fits men to undertake responsible work in almost every walk of life. Among the graduates of the college under consideration, there are represented over 300 occupations and professions. About 50 per cent of the men are engaged in some commercial line or other, as sales engineers, general managers, etc., and this indicates that the technically-trained man is usually a good business man. The analytic and deductive habits of thought induced by the engineering training tend to develop faculties which are of the highest value in the business world. That the training the men have had tends to encourage independence of thought and action is indicated by the fact that at the end of 15 years a large percentage of the men have ceased to be employes and have become employers. As at the end of 10 years less than 10 per cent of the graduates hold what might be called minor positions, a man trained in a technical school evidently has a far better chance for success than a man not so trained.

Prof. Furman gives the opinions of the leading graduates of the institution in question on the value of the training they received in college. With one exception, these opinions form a high testimonial to the education they received. Not all the men giving these opinions are engaged in engineering work, so that their views represent the measure of value which they ascribe to technical training for lines other than technical. The one discordant note recorded apparently appears to bear out Mr. Crane's contentions, but on closer study, it does not necessarily do so. The gentleman himself appears to be an unqualified success in business, although he confesses that it was not until he abandoned engineering as a profession that he became successful. The only thing that this statement proves is that the man in question was not fitted naturally for an engineer; that he had an unusually brilliant mind is evidenced by the fact that he was able to successfully complete an unusually difficult college course. A man of his ability could probably have completed an equally difficult course in any other line, as law or medicine, although this would not necessarily imply that he would make a good lawyer or physician. It is, of course, impossible to tell just what effect the training he received in college had upon his success as a business man, but in view of the opinions quoted from other graduates, it is probable that no little measure of his success may be due to the fact that he was trained in college.

It is conclusively proved not only by the paper here considered, but by many other papers and records heretofore published, that it will not do to belittle the value of technical training. The college-educated man has come to stay, and, while, in the future, many men not so trained may be found in high positions, the great majority of these positions will be filled by men who have passed through the college or technical school. Those that contend otherwise will speak from their ignorance and not from their knowledge.

THE DRAWBACK FEATURE OF THE TARIFF.

The different desires of various interests in the matter of the drawback provision constitute an illustration of the extreme complexity of the whole subject of the tariff. On behalf of the Amalgamated Association of Iron, Steel and Tin Workers a request was

made last week to the ways and means committee that the drawback provision be removed as regards tin plate. On behalf of various other interests requestes are to be made, at the hearings Dec. 4 and 5, that the drawback provision be liberalized further.

The argument of the tin plate workers is that the removal of the drawback as regards tin plate would provide work for many more men, not only in the tin plate mills, but in other lines furnishing raw materials to the tin plate industry, while the export trade using tin plate would not be greatly hampered, the difference in the cost of tin plate being relatively a minor item. It is to be noted, of course, that the amount of money involved is much less than the duty. The duty is $1.50 per 100 pounds, but the difference in cost of domestic tin plate and of foreign tin plate, duty paid, less the 99 per cent refunded, is much less than this, roughly only one-half as much.

It is curious that tin plate was one of the first commodities made subject to the drawback provision, which has gradually been made more general in its application, while it is now the first commodity mentioned for a removal of the drawback.

The arguments in these matters which are supposed to have force with congress are arguments based on the amount of labor to be given employment. For a removal of the drawback provision as relates to tin plate it is argued that more employment would be given to labor, in the manufacture of tin plate. For the extension of the drawback system, as relates to other commodities, exactly the same argument is presented, that more employment would be given to labor, but in this latter case the inference is that employment would be found in making export goods, using material imported with drawback, while employment would not be lost through foreign instead of domestic raw material being employed, i. e., that without such extension the export goods would not be made at all. In the one case the claim in substance is that the export trade is already built up, and cannot be injured, while in the other case the substance of the argument is that an export trade is aimed at which could not be created in any way except by the use of free imported materials.

That arguments similar in their aim can be presented with opposite ends in view is an interesting illustration of the complexity of the whole subject of the tariff. That the argument in favor of an extension of the drawback system is the one which will receive the more friendly consideration by the ways and means committee seems to be the opinion of observers in Washington. Indeed, it is reported that so liberal an extension is under consideration as the adoption, in whole or in part, of the French system, whereby the documents indicating that duty has been paid on a given material become negotiable instruments, to be used for the collecting of drawback on the exportation of finished products in the manufacture of which a similar, but not identical, raw material has been used. This would be a continuation of the expansion which has been in progress. The drawback arrangement was at first strictly interpreted, that the imported material should so appear in the exported product that the amount thereof could be ascertained, and it was required that the imported material should be visible at the time of export. This was liberalized so that the existence of proof that the material had been so used was sufficient. The French arrangement goes much farther, and establishes simply a general clearing house.

A Busy Brick Company.—The Bickford Fire Brick Co., manufacturer of "Crescent" fire brick, has recently opened an office at No. 1122 Farmers' Bank building, Pittsburg, in charge of J. A. Bickford, general manager, and S. M. Bickford, secretary and sales manager. The company has associated with it L. T. Munson, a man of large experience in the iron and steel trade, having for many years been secretary and general manager of the Bellefonte Furnace Co., Bellefonte, Pa. The Bickford Fire Brick Co. in November, 1907, purchased the plant and property of the Curwensville Fire Brick Co., Curwensville, Pa., and has since entirely remodeled, improved and enlarged the plant. It is now operating the plant at full capacity, with a very bright outlook.

TIN PLATE PLANT

Will Be Located at Welland, Ont., by Welsh Projectors.

Toronto, Canada, Nov. 30.—The Tin Plate Co. of Swansea, Wales, capitalized at $250,000, has signed an agreement to locate a plant at Welland, Ont., employing 250 men at the start. The erection of the building is to be begun before April next. The main building is to be 300 by 100 feet of steel construction. The town will give a fixed assessment for 10 years and will build 150 houses to accommodate their workmen.

The passenger car shop of the Rhodes, Curry & Co.'s works at Amherst, N. S., with a large quantity of material and finished and partially completed cars, was destroyed by fire Nov. 24. The loss is over $100,000, and the insurance about $75,000.

The Ontario bureau of mines has issued a statement showing the production of the mining and metallurgical industries of the province for the nine months ending Sept. 30, the total value being given at $12,205,795. Among the items are iron ore, 166,088 tons, value $448,532, and pig iron, 189,287 tons, value $3,098,661.

HARBISON-WALKER CO.'S SIXTH ANNUAL REPORT.

The Harbison-Walker Refractories Co. has issued its sixth annual report covering the fiscal period ending Sept. 30, 1908, in advance of the annual meeting, which will be held Jan. 18, 1909. President H. W. Croft in the report says that in spite of the business depression which prevailed during 11 months of the year covering this report, the company has been fortunate in operating its plants at 57 per cent of their normal capacity.

The combined profit and loss account for the year shows earnings of $1,148,408 after maintenance and expenditures amounting to $218,438.53 had been deducted. Extraordinary expenditures amounted to $77,735, depreciation to mining and tram outfits $38,504, and charged off for depletion of clay, coal and ganister properties amounted to $16,799. After these deductions there remained $1,015,367 as the net profits for the year. Payment of $127,937 interest on bonds and $575,614 dividend on preferred stock, being 6 per cent, left a surplus of $311,815. The total surplus now stands at $9,169,961.

The Atlantic furnace of the Republic Iron & Steel Co., at New Castle, Pa., was lighted Nov. 16.

PACIFIC FOREMEN

Meet With Employers at Portland—Organize to Improve Shop Practice.

(Staff Correspondence.)

Portland, Oregon, Nov. 26.—The foremen of the foundries, machine shops, pattern shops and allied metal working plants of Oregon were entertained by their employers, members of the United Metal Trades Association of the Pacific Coast, Oregon district, at a dinner served at the Portland Commercial Club, this city, on Wednesday evening, Nov. 25. About 90 metal manufacturers and their foremen sat down to the banquet, which is the first recorded social meeting of employers with their employes west of the Rocky mountains. The dinner was given for the purpose of organizing a foremen's association which will do for the shop practice of the Pacific coast what the Associated Foundry Foremen and similar organizations have done in the east. The new organization will be for the foremen of the metal working establishments of the Pacific coast and will be separate and distinct from the United Metal Trades Association or any other association of employers.

After dinner, the organization of the new body was formally discussed, O. E. Heintz, president of the Pacific Iron Works, Portland, acting as chairman and H. S. Hastings, commissioner of the United Metal Trades Association, as secretary.

Wm. H. Corbett, president of the Willamette Iron & Steel Works, Portland, outlined the purpose of the dinner and the scope of the proposed organization, which he said was to get the foremen together for their mutual advancement and education in matters pertaining to shop practice, in order that the shop methods of the Pacific coast might be improved and the coast firms thereby strengthened in their competition with the eastern manufacturers.

J. Bruce Gibson, secretary of the Sumner Iron Works, Everett, Wash., followed Mr. Corbett, emphasizing the great need of more social intercourse among the foremen of the Pacific coast in order that they may learn from one another's experience. He further stated that the discussion of problems in shop practice for mutual advantage does not give one competitor an advantage over another and that the great need of the iron industry of the Pacific coast is, "co-operation for its own upbuilding."

Chas. M. Gunn, manager of the Columbia Steel Co., Portland, pointed out that the foremen can derive more personal benefit from an organization than their employers because of their greater opportunity for technical discussion. Similar remarks were made by Samuel Morrow and A. C. Callan, of Portland, and Mr. James, president of the Variety Iron Works of Seattle.

Letters of advice and encouragement were read from men prominent in association affairs in the east, including Eugene W. Smith, president of the Associated Foundry Foremen of Chicago; D. C. Wilson, vice president Associated Foundry Foremen of New York; F. K. Copeland, president Sullivan Machinery Co., Chicago, and Dr. Richard Moldenke.

In part Dr. Moldenke wrote: "I realize that a foremen's association would be a very good thing for you. Going about the shops, as I do, and coming into intimate contact with the foremen, I find that there is a vast change in the character of the men in charge of work. I find no longer the secretiveness enveloping the individual, but on the contrary an earnest desire to know every thing pertaining to the economic production of high grade castings. The fulfillment of this desire can come about in no better way than by the formation of an association."

The following committee was then appointed to take active steps toward the organization of a Pacific coast foremen's association: Samuel Morrow, president Phoenix Iron Works, Portland, chairman; L. H. Rowe, foreman Independent Foundry, Portland, and Thomas Gaynor, foreman, Smith & Watson Iron Works, Portland. Four more members will be added to this committee, which will have complete charge of the organization of the new association. Similar steps will be taken in Seattle and other Pacific coast cities.

Bourne-Fuller Publications. — The Bourne-Fuller Co., Cleveland, jobber in iron, steel, pig iron and coke, has issued in very neat book form a new and revised standard list of extras on the finished materials which it has for sale. The book contains other information valuable for reference. The company compiles each month a stock list showing in detail the materials which it actually has on hand. This has been found a great convenience to customers, and a copy will be mailed regularly to all who wish it.

Nash, Isham & Co., 82 Beaver street, New York City, have taken the eastern sales agency for the Juniata Furnace & Fdy. Co., operating the Marshall furnace, at Newport, Perry county, Pa.

GOOD START

Is Given English Co-Operative Movement—Steel Rail Situation.

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, England, Nov. 21.

An auspicious commencement has been made with the "co-partnery" scheme promulgated recently by Sir Christopher Furness, M. P. A mass meeting of trade unionists was held in the Grand theater, West Hartlepool, on Saturday, Nov. 14. Sir Christopher spoke for more than an hour and a half, expounding the great advantages which must result to both parties from the successful working of the scheme. He announced that he was prepared to place orders forthwith for 12 vessels. This would mean six months' full work for the associated ship yards. Sir Christopher is delighted with the criticisms of his scheme which have appeared in the press. Even the socialist objections he regards as being directed not so much against him or his project as against the present order of things in general. He speaks enthusiastically of the manner in which the trade union leaders have met him in the negotiations.

The representatives of the workmen, he said, manifested in the course of their prolonged conversations an intelligence and shrewdness which could not fail to be a factor of great importance in insuring the success of the works council.

The "treaty of the Hartlepools," as Sir Christopher styles the new agreement, means in his opinion that all in the works will meet on a common ground and an equal footing. The vast amount of latent inventive faculties will be recognized instead of going to waste, new methods will be put into use for the benefit of the firm generally; that is, workmen as well as employers. Sir Christopher, however, would like to see his industrial reform supplemented by social legislation, particularly in regard to licensing laws. "I regard," he says, "a drastic reform of the licensing laws as a national necessity from the point of view of the efficiency of industry. A weak man in a thoroughfare crowded with drinking bars is very much like a bird before a party of guns." But Sir Christopher is hopeful that the friendly intimacy among all grades at the works which is sure to be fostered by the works council is likely to be of incalculable social benefit.

LARGE ATTENDANCE.

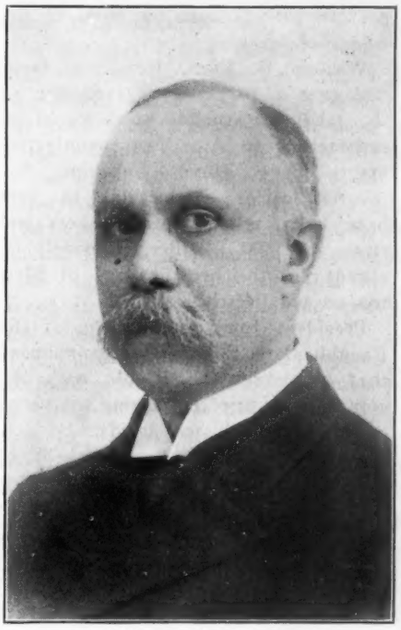
(Continued from first page.)

essary and can be reduced by proper laws, such as are in force in foreign countries. The gas engine and producer offer promise in saving coal, but they are in an experimental stage. In steam plants the total energy in coal converted to useful work averages about 10 per cent and great possibilities for conservation of the fuel supply exist here. Iron stands at the head of mineral resources. An unlimited supply is unnecessary, only sufficient for a working capital and to supply the waste of wear and tear. At present, immense quantities of iron and steel are on scrap piles because it does not pay to rework it. Conservation must be by reducing waste. The scrap dealer will become an important factor as the raw material supply diminishes.

Following the president's address, John A. Brashear, of Pittsburg, was presented by Past President W. R. Warner to the president, who conferred on him the honorary membership to which he had been elected by the council. Prof. Brashear feelingly thanked the society for the honor, and then gave an illustrated lecture on stellar photography. This most brilliant talk was along the lines of the one given at the Detroit meeting and was illustrated with photographs of constellations, nebulae, sun spots and other wonderful and beautiful phenomena. Much amusement was caused by the humorous way in which the speaker sought to explain the enormous distances involved by comparisons which required figures much larger than those actually under consideration. An extensive program of excursions has been arranged including visits to the Pennsylvania tunnels, the various power stations around New York, the high pressure fire service stations, Queensboro bridge, Brooklyn navy yard, Aetna Tool Co., and many manufacturing plants.

The New President of the A. S. M. E.

Jesse M. Smith, the new president of the American Society of Mechanical Engineers, is, like the president-elect of the United States, a native of Ohio, having been born at Newark in that state in 1848. In 1862 he moved with his father to Detroit, and from 1865 to 1868 attended the Rensselaer Polytechnic Institute, Troy, N. Y. He then traveled in Europe one year, and attended Ecole Centrale des Arts et Manufactures, Paris, three years, receiving the degree of mechanical engineer in 1872. He spent his vacations in traveling among manufacturing plants in France, Germany and Belgium, and heard lectures in the Polytechnic Institute in Berlin. After graduation in Paris, Mr. Smith spent three months among the iron and machine works of England. He began practice in engineering in 1873, designing and superintending the erection of blast furnaces for smelting native ores with raw bituminous coal in the Hocking Valley, O. He made surveys of coal mines, opened mines and built coal handling machinery for them, and he also surveyed and constructed railroads from mines to furnaces. Mr. Smith returned to Detroit when his father died, in 1880, and opened an office as consulting engineer. He designed and constructed a high



Jesse M. Smith.

speed center crank steam engine with shaft governor containing the feature of the modern inertia weight governor, and put it in operation driving a Brush dynamo producing 40 arc lights, in 1883. He presented a paper on this governor to the American Society of Mechanical Engineers in 1890.

Mr. Smith represented the United States Electric Lighting Co. in Ohio and Michigan from 1884 to 1886, during which time he erected a number of the early incandescent electric light plants, including one of 1,000 lights in the Stillman hotel, Cleveland, which was the first hotel lighted exclusively and continuously by electricity. From 1886 to 1898, he continued his work as consulting engineer, designed and erected several power plants and several plants for electric lighting and electric railways, and also apparatus for steam heating with exhaust steam in several large manufacturing plants. In 1883 he began to be called as an expert witness in the United States court in patent litigation, this practice gradually growing and displacing the work as consulting engineer, so that in 1898, when he moved to New York City, he continued the practice of expert in patent causes exclusively. Among the notable cases in which he acted as expert were: Steam injectors under the Hancock Inspirator patents; cylinder lubricators for locomotives; roller mills and middlings purifiers for flour manufacture; cyclone dust collectors; quick action air brakes under Westinghouse patents; pneumatic tires for automobiles; automobiles; automobiles under the Selden patent; induction electric motors under Tesla patents; pressure filters; incandescent electric lamps; steam heating apparatus; typewriters; armored concrete construction; the calculagraph, etc.

Mr. Smith became a member of the American Society of Mechanical Engineers in 1883; was a member of the council as manager from 1891 to 1894, and as vice president, from 1894 to 1896 and from 1899 to 1901. He is a member of the American Institute of Electrical Engineers; Societe des Ingenieurs Civils de France; Association des Anciens Eleves de l'Ecole Centrale des Arts et Manufactures; Detroit Engineering Society; Society for the Advancement of Science; American Geographical Society; Engineers' Club, and the Ohio Society of New York.

HEAVY SELLING AT BUFFALO.

(Special Telegram)

New York, Dec. 2.—Heavy selling of foundry iron at Buffalo has advanced prices of one interest 50 cents; otherwise this market is firm and quiet.

Joseph G. Butler Jr., Youngstown, O., in a public statement, declares that in no sense is he a candidate for the office of United States senator from Ohio as currently reported. Mr. Butler expresses his thanks for the kindly interest manifested by his friends in this matter.

President J. M. Hansen, of the Standard Steel Car Co., declares there is no foundation for the report that the United States Steel Corporation is negotiating for the purchase of the Butler, Pa., plant of his company with its subsidiary concerns located in that city.

TARIFF DISCUSSION

Before the Ways and Means Committee—Iron and Steel Men Heard.

Testimony was offered before the ways and means committee of the house of representatives in Washington, D. C., Nov. 25 and 27, by various representatives of the iron and steel industry at the tariff hearings. Numerous recommendations were made to the committee, and close observers hold that it is possible that a 10 to 20 per cent reduction will be made in the duties on iron, steel and metal products in the proposed tariff bill. On Wednesday, Willis L. King, of the Jones & Laughlin Steel Co., asked that the minimum duty on steel bars be advanced to 4/10 of a cent per pound instead of the present 3/10 of a cent per pound. He also asked that the duty of 5/10 of a cent on structural material and plates be retained. Questioned as to the recent comments on the tariff by Andrew Carnegie, he held that Mr. Carnegie has been out of the steel business for eight or nine years, and, the witness believed, did not know present conditions.

J. B. Wilkinson, representing New York importers, asked that classes of iron and steel material to be manufactured into products in this country valued at less than four cents, be assessed on the plane with classes valued at more than four cents, and protested against additional duty on cold-rolled material.

F. S. Witherbee, representing Lake Champlain, N. Y., iron ore interests, declared that they could stand a reduction in iron ore tariff of from 15 to 20 per cent. W. G. Mather, Cleveland, also agreed that a reduction of 15 to 20 per cent on iron ore could be made.

J. G. Butler, representing pig iron interests, asked for the removal of duty on ferro-manganese. He announced that he would submit a carefully prepared brief on the pig iron tariff to the committee shortly. Everett Brown, of New York City, representing electrical metallurgists, asked for a reclassification and the reduction of the duty on all ferro alloys except ferro-manganese.

E. C. Felton, president of the Pennsylvania Steel Co., declared that the present duty of $7 a ton on steel rails is reasonable. In reply to questions, he answered that if Mr. Carnegie knew of the present increased cost of steel rail manufacture, he would not have written what he did favoring tariff reduction. Mr. Felton said that in 1898, at the Maryland rail mills, the iron ore cost was $5.75 per ton of pig iron, but that now this cost has risen to $11.75.

W. V. Follansbee, Pittsburg, of the independent tin plate manufacturers, declared that if there were no duty on tin plate, American manufacturers could get only $2.30 per box of 100 pounds, f. o. b. the mills. While, he said, the independent tin plate manufacturers hold the belief that their industries should have all the protection possible, yet they are willing to try to do business if the present tariff of $1.50 on each 100 pounds be reduced 20 per cent. In reply to questions, he stated further that the manufacturers could stand a reduction of $1 per 100 pounds only by reducing the wages of labor.

William G. Park, Pittsburg, testified that a 10 per cent reduction of the tariff on crucible steel would be satisfactory to American manufacturers. James Floyd, Lebanon, Pa., favored various reductions in iron bars, bolts, spikes, nuts, washers and rivets. J. M. Miller, Philadelphia, asked that the present duty of $4 a ton on pig iron be retained.

President John A. Topping, of the Republic Iron & Steel Co., announced that he would shortly file with the committee a brief embracing his views on the iron and steel tariffs.

President James A. Campbell, of the Youngstown Sheet & Tube Co., said that the present duty of $40 a ton on steel pipe could be reduced to $20 without injury. James H. Nutt, representing the Western Bar Iron Association, asked that the present conditions on bar iron be retained, and especially that the differential between steel and iron bars be not overlooked. Nelson Lyon, representing a wire cloth manufacturer, at Tarrytown, N. Y., wanted the tariff on pig iron abolished. J. F. Orton, representing the Reform Club, of New York City, insisted that all iron and steel products be placed on the free list.

PERSONAL.

William L. Hoffman, connected with the pig iron department of the Tennessee Coal, Iron & Railroad Co., both before and after Corporation control, has associated himself with Crocker Bros. He has a wide acquaintance in the Philadelphia field. He will cover New York territory for Crocker Bros.

J. T. Morrison, who has been chairman of the freight committee for the past five years of the National Association of Implement and Vehicle Manufacturers, Chicago, has been appointed secretary of the national association. In naming a secretary thoroughly competent to handle freight matters, the association officers believe that at this time a stride has been made in the right direction by having all of Mr. Morrison's time to give the members, something more than they have ever had from that standpoint.

DEATH OF GEORGE W. CORBIN.

(Special Telegram.)

New York, Dec. 2.—George W. Corbin, president of the P. & F. Corbin Co., died at his home in New Britain, Conn., of cancer, on Dec. 1. In addition to his connection with P. & F. Corbin Co., one of the largest hardware concerns in the country, he was manager of the Cabinet Lock Co., and president of the Corbin Bros. Co. He was connected with the Corbin-Church Co. and the Dean Steel Die Co., also with several New Britain banks. He was once mayor of the city.

Henry P. Coburn, a prominent citizen of Hamilton, Ont., died on Nov. 25, aged 73 years. He was vice president and manager of the Sawyer & Massey Co., manufacturer of agricultural implements, having been associated with the business for 44 years.

William Henry Jackson, president of the Wm. H. Jackson Co., New York City, and one of the best known figures in the architectural iron business, died Nov. 24 at his home at the age of 79. The business was founded in 1827 by his father, Nathan H. Jackson, and the works were established in 1840, being the first iron foundry to make a specialty of castings for buildings.

The car works at Philadelphia of the J. G. Brill Co. sustained severe damage by fire, Nov. 29. The steel sheds with iron roofs in which dry lumber is stored were destroyed, together with fine lumber. The loss will reach probably $200,000, fully covered by insurance. It is not believed that the fire will seriously interfere with any of the company's contracts.

President C. W. Bray, of the American Sheet & Tin Plate Co., has denied knowledge of any combination of American and English tin plate manufacturers which was reported from London as having been effected.

The stack of the Adrian Furnace Co., DuBois, Pa., blew in Nov. 24.

AMONG MACHINERY MAKERS.

CHICAGO.

Some Railroad Buying, But Business is Only Fair.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Block, Nov. 24.

Manufacturers and dealers throughout this territory and in the south report conservative but not extravagant increases in the business they are doing. Expectations of the speedy closing of large orders have been rather disappointed. The list from the large western road which has been in the market for a number of weeks past has been almost entirely placed, the orders being well distributed with Manning, Maxwell & Moore and the Niles Tool Works obtaining the largest allotment. The Union Pacific road has just issued an attractive list including a number of heavy tools and the inquiry for individual tools is very fair. The buying of raw material by machinery builders has developed considerably larger proportions in the last couple of months and may be taken as an evidence of the extent to which the finished tools are being moved.

The insolvency of the Sandwich Woodenware Co., Sandwich, Ill., has resulted in a trustee's sale of the following woodworking machinery: Cabinet planer, pony planer, jointer, four side sticker, shaper, band saw, self feed rip saws, cut-off saws, gang boring machines, dowel machine, sander, emery wheel and stand, Sturtevant fan and a list of general shop equipment.

The Scullin-Gallagher Iron & Steel Co., St. Louis, Mo., is to build some small additions to its steel castings foundry to make provision for a sand mill and storehouse. The construction work will cost about $4,000.

The Corrugated Bar Co. is the name under which the company formerly known as the Expanded Metal & Corrugated Bar Co., of St. Louis, will operate in the future. The company has also moved into new offices at 1410-19 National Bank of Commerce building, St. Louis. The large development of its reinforcing steel bar business led to the adoption of the more significant name for the company.

A new power plant for the Manhattan City & Interurban Railway of Kansas City, Mo., will be installed by the Minneapolis Steel & Machinery Co. The plant will include a heavy duty Twin City Corliss engine, 18 x 36 inches, two 66 x 18 return tubular boilers with auxiliary equipment, heater, purifier, feed pump, etc., and a 20-kilowatt direct current generator installation.

Roth Bros Co., 27 South Clinton street, Chicago, manufacturer of electrical machinery, has leased a warehouse to be built at the corner of West Adams and Loomis streets, which it will occupy about May 1 of next year. The building will be of mill construction, two stories, 94 x 125 feet.

The Illinois Car & Mfg. Co., mention of the incorporation of which was made previously, is planning the erection of a two story factory at Chicago. P. H. Joyce, of the Illinois Bolt, Nut & Forging Co., Thirty-fifth and Ashland avenue, is president.

The Michigan United Railway Co. is about to erect in connection with a new terminal station and freight sheds at Jackson, Mich., a general repair shop, the entire outlay to cost in the neighborhood of $100,000. Myron W. Mills at Marysville is the president.

The Faeth Iron Co., Kansas City, Mo., will build a new plant on property it has acquired in that city. It is planned to put $100,000 into the new plant.

The Cutler-Hammer Co., Milwaukee, manufacturer of electrical apparatus and lifting magnets, is building an addition to its present plant that will cost in the neighborhood of $75,000.

E. C. Long Mfg. Co., Hannibal, Mo., is building a machine shop 50 x 125 feet from plans prepared by M. S. Martin, of that city.

The entire plant of the Anniston, Ala., Stove Works, has been purchased and will be operated by the Lee Foundry Co., whose incorporation was reported a short time since.

A blast furnace company incorporated in Missouri under the name Mississippi Valley Iron & Furnace Co. with a capital of $1,500,000, has been formed. The incorporators are E. J. Burton, W. D. Walker and Samuel Woodward. It is understood that this is a project for using local Missouri ore.

The St. Louis Gravel & Sand Co., St. Louis, Mo., of which R. G. Mincke is secretary, is in the market for a locomotive crane, hoisting machinery and dredging machinery.

INDIANAPOLIS.

World's Fair Proposition Opposed—Plant Additions.

Indianapolis, Nov. 30.—The Indianapolis Commercial Club is attempting to arouse interest in a proposition to hold a world's fair here in 1911 and is now considering ways and means for raising the money necessary. Practically all of the local manufacturers and merchants are opposed to the scheme. At present time, it looks very much like the project would be a failure.

The Indiana Rolling Mill Co., of Newcastle, is erecting a number of additions to its plant, as follows: Office and varnish room, 70 x 20 feet; finishing room, 70 x 50; handle storage, 50 x 50, and another building to be 70 x 100 feet.

E. C. Atkins & Co., manufacturers of saws and tools, are increasing their working force and are also increasing the number of hours of work for the week. The company has noticed an improvement in business conditions since election.

Caldwell & Drake, iron manufacturers and general contractors, of Columbus, state they expect to resume work on the new state house at Little Rock, Ark., soon. It was found some time ago that the money appropriated for the work had lapsed and new appropriations will have to be made. The state of Arkansas now owes the company $89,900.

The Elwood Lawn Mower Co., of Elwood, has increased its capital stock from $10,000 to $25,000, and will take steps immediately to increase the capacity of its plant.

A. O. Haney, of the Haney Engine Works, Ligonier, has perfected a new, low compression, self-igniting gas engine and is attempting to organize a company for its manufacture.

The Overland Automobile Co., of this city, is building a large addition to its plant and has also purchased the plant of the Marion Motor Car Co. It hopes to be able to turn out 15 completed automobiles a day within the near future.

MILWAUKEE.

Machinery Manufacturers Seek More Fire Protection—News Notes.

Milwaukee, Wis., Nov. 30.—With the aim of securing better and additional fire and police protection, many of the machinery manufacturing concerns located just outside of the city limits on the southern outskirts of Milwaukee, are favoring a decided extension of the proposed annexation lines.

Milwaukee brake manufacturers say that they are meeting with decided improvement in general business. Both the National Brake & Electric Co. and the air brake department of the Allis-Chalmers Co. are experiencing a revival of orders.

"We have been working full time since Aug. 1 and the prospects are better than they have been for years," says R. P. Tell, of the National Brake & Electric Co.

The Milwaukee board of public works is asking for bids for the erection of the new bascule bridge at East Water street. Bonds to the amount of $200,000 for the project were recently purchased by a Boston brokerage firm.

The Green Bay Cornice & Corrugating Co., at Green Bay, Wis., will erect next spring a new building on the ground recently acquired. The new structure will have a dimension of 198 x 159 feet and will be of fireproof construction.

The force of employes at the Milwaukee plant of the International Harvester Co. has been increased since last spring from about 1,200 to about 2,000, the number on the pay roll at the present time. The average force employed when the plant is running at full capacity is but slightly smaller than this and, if conditions improve according to expectations, all of the old men will soon be at work.

Sheboygan, Wis., is completing plans for the erection of a $90,000 steel bascule bridge at Pennsylvania avenue.

John Hayes is the leading organizer of a new concern at Grand Rapids, Wis., which is now erecting a new plant in that city for the manufacture of punches, shears and other devices used in iron manufacturing plants.

The Prescott Light & Power Co., Prescott, Pierce county, Wis., has been incorporated with a capital stock of $30,000 by Herman Mercord, Nicholas Kohl and Benjamin Kohl.

NEW YORK.

Heavy Buying of Machine Tools Still Depends on the Railroads.

Office of THE IRON TRADE REVIEW,
Room 1005, No. 90 West St., Dec. 1.

The local machine tool trade continues the even tenor of its ways, with practically no features of importance. The improvement in business has assumed sufficient proportions to make sure that it is actual, and not a mere post-election spurt, but no large buying movement has developed and none is expected until the pace is set by the railroads. Buying during the past week has again been chiefly of one or two tools placed here and there, but has aggregated a good volume. A brisk trade is noted in equipment for small shops, and a heavy run is reported on small lathes. There has also been some important selling of second hand machinery.

A project of considerable magnitude has come to light through the application to the public service commission by the New York, New Haven & Hartford railroad for permission to electrify its suburban division from 129th street to New Rochelle, where it joins main line, which is now operated electrically as far out as Stamford. A $15,000,000 bond issue will finance the project. Eventually it is expected that the New Haven will establish an important terminal at the Harlem river end of the branch of the suburban road.

The Columbia Typewriter Co., 37 West 116th street, New York City, has been purchasing a number of small machine tools of late. A repair shop is being equipped.

The Columbia Ribbon Co., Paterson, N. J., is to erect a silk mill about 60 x 150 feet, in that city. The structure will be of brick, four stories in height. The general contract has been let to the John W. Ferguson Co., Paterson, and involves about $50,000.

The contract for the erection of a brick and steel foundry building to be erected at Locust and Atherton streets, Yonkers, N. Y., for the Otis Elevator Co., 17 Exchange place, New York, has been awarded to George T. Kelley, of Yonkers. Work is to be started at once and the building will probably be ready for occupancy by March.

The Georgian Mfg. Co., Binghamton, N. Y., has closed contracts with the building firm of A. E. Stephens & Co., in that city, for the erection of a complete foundry plant, consisting of a large foundry building, a pattern shop, a storage house and material sheds. Plans are now being prepared for a large brick factory building for this company.

The Blake & Johnson Co., Waterville, Conn., has work well under way on a concrete factory building, one-story, which will be one of the largest of its kind in New England.

The Ernst Wiener Co., manufacturing industrial cars, trackage, etc., announces the removal of its general offices in this city to the Hudson Terminal building, 50 Church street.

PITTSBURG.

More Substantial Improvement—Plant Enlargements.

Office of THE IRON TRADE REVIEW,
510 Park Bldg., Dec. 1.

The machine tool situation presents evidence of more substantial improvement. Some of the local sellers report having closed more contracts the past week than for a number of months, although the orders individually are small and call largely for machines for replacements. The outlook for a larger trade volume is improved, however. In the heavier machinery lines, a great deal of work remains in the estimating stage and draughting rooms are busy, but there is still a general hesitancy as to giving instructions for proceeding with projects under advisement.

The Keystone Iron & Steel Co. has been incorporated under the laws of Pennsylvania and has established an office at 1301 Park building, Pittsburg, with Benjamin Haas, formerly with Joseph Joseph & Co., in charge as vice president and general manager. The company will do a general iron and steel business and will make a specialty of handling sheets, sheet bars, billets, muck bar and rails.

C. A. Turner, Inc., Pittsburg, was the high bidder for the mechanical equipment of the Pittsburg Trolley Pole Co. offered at receiver's sale Nov. 20 by the South Side Trust Co., of Pittsburg. The equipment consisted of machine tools and other appliances.

The Pittsburg Piping & Equipment Co. has taken the contract for furnishing and erecting the piping equipment for the new puddle and skelp mill being erected at Girard, O., by the A. M. Byers Co.

The Standard Plate Glass Co. has completed arrangements for doubling the capacity of its plant at Butler, Pa., and the improvement will entail the installing of much additional glass making equipment. The extensions planned consist of a main building 150 x 225 feet with a lean-to 40 feet wide extending the entire length, a second building, 50 x 166 feet, and a smaller structure. The buildings will all be of steel construction and the contract for the fabrication and erection has been awarded to the Bollinger-Andrews Construction Co., Pittsburg.

The West Penn Railways Co. is completing an extensive enlargement of its power plant facilities near Green Junction, Pa. The work which has been in progress for a number of months will shortly place the company in possession of one of the most completely equipped and modern electric power

plants. Ten 375-horsepower water tube boilers equipped with Murphy automatic stokers have been installed, and to provide the additional space thereby required, the plant buildings have been extended. In the engine room a 3,250-kilowatt Parsons turbo-generator manufactured by the Westinghouse Electric & Mfg. Co. has been placed and is in operation, while a second similar unit is now being installed. Important improvements in the switchboard and switching arrangements have also been made. L. H. Conklin, general superintendent, is in general charge of the improvements.

The entire plant of Paul Stan & Co., Homestead, Pa., manufacturers of ornamental iron and fire escapes, will be offered at assignee's sale Dec. 15 by the South Side Trust Co., of Pittsburg, assignee. The equipment consists of gas engine, drill presses, shear and punching machine, power metal saw, shafting, pulleys, belting, tools, etc., in addition to a stock of iron, steel, pipe and products finished and in the process of manufacture.

PHILADELPHIA.

Gradual Improvement, But Decided Increase Not Expected Soon.

Office of THE IRON TRADE REVIEW,
408 Central Trust Bldg., Dec. 1.

A moderate, though steady, increase in business is reported quite generally by local manufacturers and dealers in machine tools. Throughout the trade inquiries appear to be quite numerous, irrespective of the line of product, and orders are certainly better than during the month of October. However, the general belief is that the full force of improved conditions will not be felt until some little time after the turn of the year, when it is expected that an important purchasing movement by the railroads will be started.

If the appropriations requested for the League Island navy yard for the ensuing year are forthcoming, very extensive improvements will be made at that place. Altogether, about $725,000 is asked for. Of this, a considerable part is needed for dredging purposes, but $172,600 is asked for centralization of the electric power plant and $10,000 to provide additional barracks so as to allow the construction of a new building to cost a large figure.

The contract for the construction of the filtration plant at Wilmington, Del., has been let to Coleman Bros., Boston, at $257,500. Work is to be begun at once and the entire plant, with a capacity of 15,000,000 gallons a day, is to be completed by Dec. 1, 1909.

The Radford Pipe Works, Radford, Va., is to make important additions to its plant at a probable cost of $50,000. The Virginia Bridge & Iron Co., Roanoke, Va., has been awarded contracts for the necessary steel work.

Hilles & Jones Co., manufacturer of machine tools at Wilmington, Del., reports that it has booked more orders during the last three months than it was able to secure during any recent similar period, and believes that conditions at present indicate further improvement.

The R. S. Newbold & Son Co., Norristown, Pa., has secured orders for the stoves, castings and mains for the Colonial Iron Co., Riddlesburg, Pa. Its boiler shop is well supplied with orders and inquiries are reported as numerous.

The Baldwin Locomotive Works, Philadelphia, states: "Since the presidential election there has been an increase in our business and we look for substantial improvement in 1909."

The Geo. P. Pilling & Son Co., Philadelphia, has let contracts to the Roydhouse-Arey Co., for a five-story factory building as an addition to its present plant. The company manufactures surgical instruments.

Horace T. Potts & Co., Philadelphia, dealers in iron and steel, are to erect an addition to their warehouse at 215 South Second street.

The Newton Machine Tool Works, Inc., Philadelphia, notes a considerable improvement in the demand for machine tools, and expresses the belief that the only thing required now is the coming into the market of the railroads. A representative of this company, who has just returned from a trip through the middle west, states that everywhere people are progressing with long-delayed and contemplated improvements, and everyone is finding an increase in the volume of business.

The Gregg Carriage Co., Philadelphia, is to erect a four-story factory building, 50 x 150 feet, at 1926-32 Arch street. The building contract has been awarded to Chas. W. Denny.

The Philadelphia Roll & Machine Co., Philadelphia, is completing a three-high 18-inch mill. It notes a general improvement in the demand for chilled and sand rolls and other rolling mill equipment.

The Standard Oil Co. is erecting a number of large tanks at Center Bridge, Bucks County, Pa., where it has acquired a considerable tract of land. It has also purchased ground at Colora, Cecil county, Md., on which large storage tanks will be erected.

The Lincoln Furniture Co. is to build a four-story concrete factory, 75 x 400 feet, at Nineteenth street and Lehigh avenue, Philadelphia. Construction work will be done by the Wm. Steele & Sons Co.

Dienelt & Eisenhardt, Inc., Philadelphia, advise that business during the last few weeks has increased slightly and that they are hopeful of seeing a decided change in the course of a couple of months. The recent receipt of numerous inquiries leads them to believe that there will be an early revival of activity.

The Eynon-Evans Mfg. Co., Philadelphia, notes a considerable improvement in business since the election. Inquiries have been more plentiful and there has been some increase in orders in spite of the tendency toward higher prices. The company is not yet running at full capacity, but looks for great improvement after the first of the year.

Contracts have been let for a four-story concrete warehouse, 80 x 200 feet, for Fels Bros., soap manufacturers, at their plant on Island Road, Philadelphia. The cost will be over $100,000.

The Monarch Emery & Corundum Wheel Co., Camden, N. J., states that the grinding machine and wheel business is improving steadily and has been doing so for the last three or four months. Orders are more frequent and of better size.

CINCINNATI.

Fair Business With Very Hopeful Feeling as to Future.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., Dec. 1.

The past week has been interrupted by a holiday, which to some extent accounts for a slightly more quiet trade condition, but the manufacturer is none the less hopeful as to the outlook, and the forecast for the machinery and machine tool trade for the new year, based on the expressions of the makers is decidedly encouraging. Just after the election, a number of orders were turned in that had been held up waiting the result, and this gave such an impetus to the trade as to make the shops a little more expectant as to a continuance of such orders than was entirely justified. There has been, however, a fair run of business coming in for all classes of machines, but the buying, while steady, is not large in volume as yet. Some new engine installations are in sight, one of which may be closed this week. Boiler makers are fairly

busy with all kinds of work from repairs to new boilers.

Some of the shops closed down for the three days at the close of the week, but this is somewhat customary at this season and is not indicative of anything in the way of business conditions.

As the year draws to a close, there is some figuring on contracts for castings for the coming year and some contracts have been made in the past week.

The week furnishes but little in the way of special comment. The most satisfactory evidence of conditions is the hopefulness in all lines and the optimism of men in the iron, steel and machinery industries.

CLEVELAND.

Few New Orders—Business Slack Except in Automobiles.

Office of THE IRON TRADE REVIEW, Browning Bldg., Dec. 1.

There seems to have been a reaction in the machinery market of this territory during the past week. Immediately after election numbers of big orders were placed with different manufacturers, and business seemed to increase to a sufficient extent to warrant the prediction that prosperous times were once more at hand. But it seems that these orders were merely old ones which had been hanging back until after election, and that really new business is not to be expected to any great extent until the early spring.

Automobile manufacturers have been busy doing a good business for months and most of them are now working over time. Makers of small types of machinery are also very busy and working almost full time, adding to their working forces now and then. But the manufacturers of expensive machines such as drills, lathes, and the like, have had to content themselves with doing what little came their ways and making plans for the future.

The Peerless Motor Car Co., which has recently commenced the construction of a large addition, reports an increase in output of about 40 per cent. The company has lately moved into a new assembly room.

For the past six weeks, the Wyman & Gordon Drop Forging Co. has been working full force, and for the last two weeks has been operating overtime. Business is very good and many large orders are being filled.

The Chisholm-Philips Automobilium Co., selling agents for the Stevens-Duryea car, is doing a good business, much better than last year. The company now has on hand a catalog of specifications for new 1909 models of the different types of cars and expects the new year to find the concern doing even an increased business.

The Lincoln Motor Works has booked many new orders which came directly after election. The company is working full time and force and doing a good business.

IRON TRADE IMPROVEMENT IN MILWAUKEE.

Milwaukee, Nov. 30.—General improvement in the iron trade is the report of all Milwaukee iron manufacturers. Sales are growing from week to week and inquiries would indicate a continuation of the business revival. The market has stiffened perceptibly, especially for all northern iron, which is selling upon the average of $17.50 per ton.

The new dry blast of the Northwestern Iron Co.'s plant at Mayville, Wis., is expected to be ready for operation by the middle of December. The new ore thawing house is now completed, the recently installed slag crusher is in working order and the entire plant is in busy operation. Milwaukee officials of the company announce that business has been greatly revived and that sales of iron in the past few weeks have been remarkably large. Exceptionally good iron orders have been received from manufacturers and the company believes that prospects for the future could not be better.

RECENT CUSTOMS DECISIONS.

The board of United States general appraisers held in protests of Central Vermont Railway Co., that where a drawback has been allowed on the exportation of articles of the produce and manufacture of the United States, described in paragraph 483, such articles can be re-imported into this country only on the payment of duties equal to the drawback so allowed and that relief will be granted only on specific grounds set out in protests duly filed.

The meaning of section 23, customs administrative act of June 10, 1890, was judicially construed by the board of United States general appraisers to be that no allowance for damage of goods imported into the United States shall be made or relief from payment of duties thereon unless notice be made in writing and filed with the collectors of customs of the importer's intention to abandon the goods to the United States and that an oral notice or notice by telephone is not sufficient.

ELECTRIC SMELTING

Is Being Critically Investigated by Canadian Government.

Toronto, Canada, Nov. 25.—Dr. Eugene Haanel, Canadian director of mines, will leave for Sweden in the course of a few days to make further investigations with respect to electric smelting as applicable to Canadian conditions. The result of the experiments made at Sault Ste. Marie, Ont., two years ago under Dr. Haanel's supervision, encouraged a Swedish firm of ironmasters to make further investigations on their own account. They employed a commission of three experts and after a long-continued series of experiments have installed a furnace at Dumnarfvet which is claimed to be a great improvement on any so far devised. It will be started on Dec. 1 and Dr. Haanel has acceded to an invitation to be present and will report on its operation.

The problem is regarded by the government as of special importance to Canada on account of the extensive deposits of iron ore in Quebec and Ontario which being high in sulphur cannot be handled in the ordinary blast furnace, and are remote from coal supplies though in many cases there are extensive water powers in the neighborhood from which electric energy could be cheaply generated. Some details concerning the new Swedish furnace have been received by Dr. Haanel, which encouraged the belief that the system will be found available commercially. It is constructed to use 800 horsepower in place of the 250 horsepower used by the Sault Ste. Marie furnace, and on the same plan a furnace of 3,000 horsepower could be erected which would have a capacity of 10,000 tons of pig iron per year. Such a furnace would cost $20,400. The cost of the product under the Swedish process would be $12.03 per ton, or about three-quarters of the Canadian cost of producing pig iron by present methods.

The Wabash railroad advises respecting plans for replacing the foundry recently destroyed by fire at Moberly, Mo., that nothing has been decided upon definitely as yet.

The Jenney Electrical Mfg. Co. has filed notice of increase of capital stock from $450,000 to $600,000, and change of place of business from Indianapolis to Anderson, Ind.

NEW PLANTS

Are Being Established in Various Cities of Indiana.

Indianapolis, Ind., Nov. 28.—The Modern Concrete Co., manufacturer of machines for making concrete blocks, will establish a new plant at Linton. A factory is now operated by the company at Terre Haute.

Ambrose Petry, of Detroit, and H. O. Olds and M. O. Straight, of Newcastle, are preparing to establish a plant for the manufacture of artificial gas in the latter city.

It is understood that the Automatic Roller Bearing Co., now located in Chicago, will move to Goshen in the near future. Negotiations between the company and the Goshen Commercial club have been on for some time, the company asking a site of 20 acres and promising to employ about 2,500 men.

Information has been received here that the Muncie plant of the American Sheet & Tin Plate Co. will soon resume operating after an idleness of almost one year. Extensive repairs have been made and the plant can resume on a few hours' notice. About 450 men are employed when the works run with a full force.

J. N. Willys, president of the Overland Automobile Co., and E. B. Campbell have purchased a controlling share of the stock of the Marion Motor Car Co. and the latter plant is now being used for manufacturing parts for the Overland cars. Later it is the intention to manufacture the Overland six-cylinder car in the plant.

Rubush & Hunter, architects, will be ready to receive bids for the construction work of the new city hall in about 45 days. The city council has authorized a bond issue of $600,000 for the work. The building will be of hard burned brick and stone and considerable steel will be used.

LOOKING INTO THE FUTURE.

The third annual issue of the Business Prospects Year Book has been published by the Business Statistics Publishing Co., 12 James street, Cardiff, Wales. The volume contains forecasts concerning copper, coal, iron, tin, shipping, money, rails, cotton, wheat, hog products, dairy products and tin plates for the year 1909. To make predictions is always perilous, but the publisher claims that the forecasts are based on a careful analysis of statistics and other facts available, and that the manner in which the facts of this and last year have proved the correctness of the forecasts made in the first two issues is strong evidence that the basis on which the anticipations are made is a correct one. Whether the predictions will be more trustworthy than those of Samuel Benner, the Ohio farmer, whose prognostications have attracted much attention in spite of the fact that they are often unfulfilled, remains to be determined. It is true, however, that the slump of 1908 was predicted more than a year ago. The prediction concerning iron for 1909 is as follows:

"The possible supply will throughout the year be in excess of the demand, with keen competition for orders. Iron prices will show some further, though not important, fall, and will average less than either of the three preceding years. Wages in the iron trade will fall, and work will be less regular than in 1906 or 1907, but as good as in 1908. Profits made by iron masters will be reduced. The shares in iron and steel concerns will show little variation."

RATES ON STRUCTURALS.

(Special Correspondence.)

San Francisco, Nov. 27.—A number of manufacturers of structural steel assembled recently in the rooms of the California Metal Trades Association and discussed freight rates. From statements made by manufacturers and traffic managers, the California manufacturers are under a disadvantage as against eastern competitors, and several important interests of the Pacific coast will make a concerted fight for a differential, and will try to combat the powerful corporations of the east.

James A. Keller, traffic manager for Baker & Hamilton, spoke on the grouping of freight rates on structural steel material from points east of the Mississippi river to the Pacific coast terminals.

A conference will be held in this city early in December to adjust the grievances of the Pacific coast people, give and secure just and equitable rates, and settle all differences between manufacturers and carrier. The conference will be attended by representatives of the California Metal Trades Association, United Metal Trades of Oregon and Washington, Founders' and Employers' Association of Los Angeles, and the railroad officials. A delegation of Pacific coast representatives will also be sent to the meeting of the Transcontinental Freight Bureau, to be held in Chicago next January.

NEW FREIGHT TARIFFS

Especially on Finished Products Arouse Coast Buyers.

Office of the MARINE REVIEW,
302 Pioneer Bldg., Seattle, Wash., Nov. 28.

The new freight tariffs of the Transcontinental Freight Bureau which are to take effect Jan. 1, 1909, have just been issued. Several changes of interest and importance to consumers of iron products on the Pacific Coast are found in the new tariff. In general, the rates on primary products, such as pig iron and castings, have not been changed, while those on finished and partially finished materials have been advanced from 6 per cent to 30 per cent. Another important feature of the new tariff is the establishment of a differential in favor of fabricated structural material over plain beams, channels, etc. This differential amounts to $3.00 per ton, but the variety of articles included in the structural grouping has not been reduced. Some of the new rates are as follows: Plates No. 11 and heavier, 95 cents per 100 pounds, an increase of 20 cents; I-beams, channels, zees, etc., 80 cents, an increase of 5 cents per 100 pounds; iron bars and slabs, 95 cents, an increase of 20 cents per 100 pounds; cast iron pipe, 60 cents per 100 pounds, an increase of 10 cents, and an increase in the medium carload weight from 30,000 to 40,000 pounds; wrought iron pipe, including boiler tubes, has been increased 6 cents per 100 pounds, to 60 cents. The new rate on fabricated columns, girders, etc., is 95 cents per 100 pounds. The old rate was 75 cents.

Fifty thousand tons of pipe, 8,000 tons of fittings, 4,000 tons of special fittings, 12,000 tons of hydrants, two fire boats, new pumps and turbines are included in the specifications for the new proposed fresh water and auxiliary salt water supply system for the fire protection of the city of San Francisco. The metal trade interests of the Pacific coast are making every effort to have as much as possible of this work done west of the Rocky mountains. The California Metal Trades Association has appointed a committee consisting of Messrs. Dodd, Kerr, Doble, Fowler and Postlethwaite to look after the letting of the contracts for this new work, and to keep as much as possible of it in the shops of San Francisco. These gentlemen will work in conjunction with Messrs. W. E. Bayer, representing the local pump manufacturers, and John E. Doak, representing the gas engine builders, and the executive committee of the Iron Trades Council of San Francisco.

EFFICIENCY TESTS OF MILLING MACHINES AND MILLING CUTTERS.[1]

By A. L. DeLeeuw.[2]

The design of standard machine tools was for many years, and has been until quite recently, a matter of practical experience, judgment and intuition, and might as well have been called guesswork. Special tools of unusual magnitude were built on somewhat more scientific principles, and this, perhaps, simply because the required dimensions were quite out of the scope of the designer's experience. This condition was not due to ignorance on the part of designers or inability to apply engineering data, but to the fact that such data did not exist or were not public property when they did exist. Further, there was no inducement for the machine tool builder to spend time and money collecting data, as the tools, as built, filled all requirements to a reasonable extent.

This condition ceased to be satisfactory with the coming of the electric motor into the field of the machine tool builders. At first the wildest and most varied guesses were made as to the size of motor required to drive a certain tool. One builder would supply his machine with a 2½-horsepower motor, while another would equip the same size and style of machine with a 15-horsepower motor. This chaos was made worse by the fact that most purchasers of motor-driven tools would specify the size of motor to drive the machine. One user would condemn the machine tool builder because the 10-horsepower motor was entirely too small and the next one because a 5-horsepower motor was much too large, for the same machine.

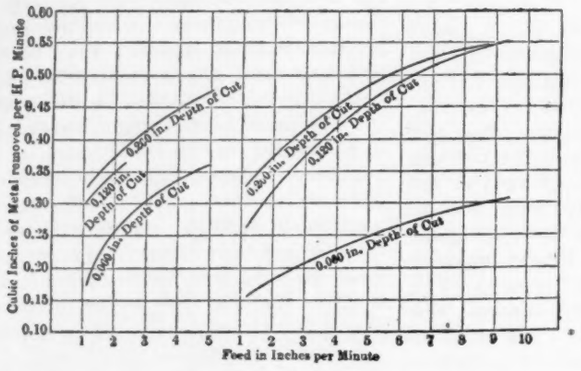

Cubic Inches of Metal removed per H.P. Minute
0.250 in. Depth of Cut
0.120 in. Depth of Cut
0.060 in. Depth of Cut
0.030 in. Depth of Cut
0.040 in. Depth of Cut
Feed in Inches per Minute

FIG. 1—CUTTING SPEED 12 FEET PER MINUTE.

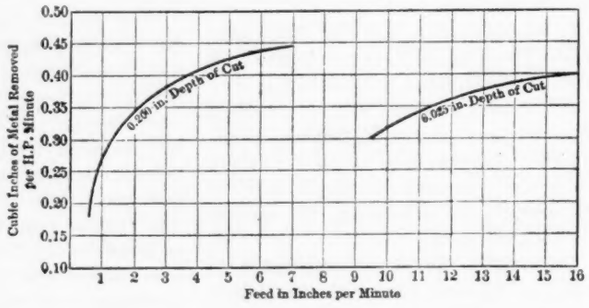


FIG. 3—WORK OF 1 HORSEPOWER-MINUTE, MEASURED IN CUBIC INCHES OF METAL REMOVED; CUTTING SPEED 45 FEET PER MINUTE, FEED INCREASING.

FIG. 2—CUTTING SPEED 32 FEET PER MINUTE.

WORK OF 1 HORSEPOWER MINUTE MEASURED IN CUBIC INCHES OF METAL REMOVED, FEED INCREASING.

This brought before the machine tool builder the fact that a machine was not always used to its full capacity and was sometimes badly overloaded. In sheer self-defense the machine builder was compelled to determine for himself the proper size motor to be put on his machine, and he began to make tests and collect data. Crude as most of these tests were, they laid the foundation for a reasonable method of machine tool design.

Before some semblance of order was created out of this chaos, a second disturbing factor made itself felt; high speed steel.

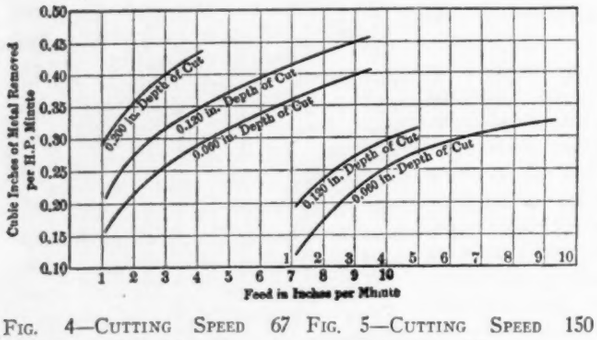

Cubic Inches of Metal Removed per H.P. Minute
0.200 in. Depth of Cut
0.120 in. Depth of Cut
0.060 in. Depth of Cut
0.120 in. Depth of Cut
0.060 in. Depth of Cut
Feed in Inches per Minute

FIG. 4—CUTTING SPEED 67 FEET PER MINUTE.

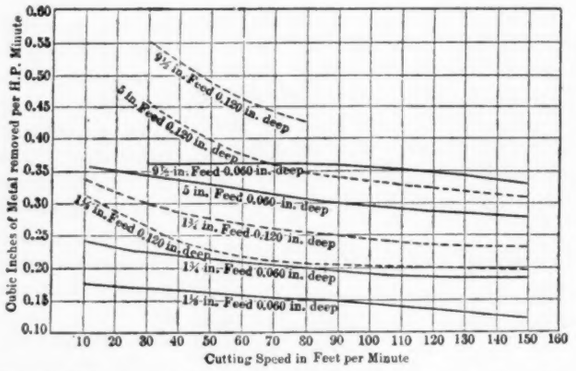

Cubic Inches of Metal removed per H.P. Minute
9½ in. Feed 0.120 in. deep
5 in. Feed 0.120 in. deep
9½ in. Feed 0.060 in. deep
5 in. Feed 0.060 in. deep
1¾ in. Feed 0.120 in. deep
1¾ in. Feed 0.060 in. deep
Cutting Speed in Feet per Minute

FIG. 6—WORK OF 1 HORSEPOWER-MINUTE MEASURED IN CUBIC INCHES OF METAL REMOVED, CUTTING SPEED INCREASING.

FIG. 5—CUTTING SPEED 150 FEET PER MINUTE.

WORK OF 1 HORSEPOWER MINUTE MEASURED IN CUBIC INCHES OF METAL REMOVED, FEED INCREASING.

[1]Abstract of a paper to be presented at the New York meeting (December, 1908) of the American Society of Mechanical Engineers.

[2]Cincinnati Milling Machine Co., Cincinnati.

Measure of Machine Tool Performance.

The first attempt of the machine tool builders was to determine the proper size of motor for a given tool. For years past machine tool designers almost uniformly credited a double belt with a pulling power of 50 pounds per inch width. Tests showed that a belt would do twice and even three times as much, though this was bad practice as far as the belt itself was concerned. Another factor in the calculation of the horsepower was the speed of the belt. And even if the belt power could be calculated, was this the proper power for the machine? Would the machine stand all that the belt would stand? Or again, was the driving power all the machine would stand?

This showed the necessity of establishing some standard which would be a measure for the performance of the machine, a basis for calculating the size of motor or other source of driving power, and a gage to which the different functional parts of the machine could be proportioned. At first the pressure at the tool point was taken for this standard.

The difficulty of determining the pressure at the tool post required for a given cut led to the fairly general adoption of another standard, the amount of metal removed per minute. The whole matter is still in an unsettled condition. Specifications for machine tools calling for a guaranteed output are by no means general, but the general tendency seems to be in this direction. It may be possible that some day in the future, machine tool builders will adopt a set of rules by which to indicate the capacity of a machine, and the first item would doubtless be the amount of metal removed per minute.

Though numerous tests have been made as to performance of machine tools, they have been confined almost exclusively to lathes. All other machines seem to have been considered as following the lathe in cutting characteristics.

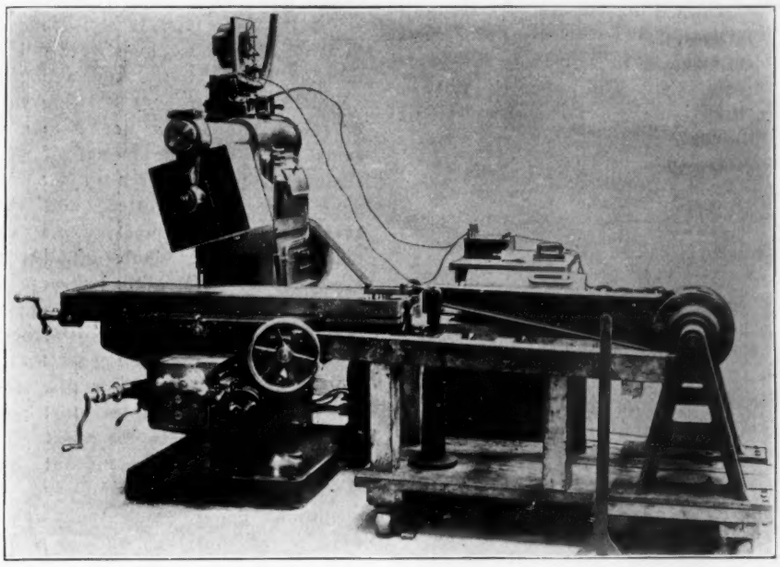


FIG. 7—APPARATUS FOR TESTING FEED EFFICIENCY OF MILLING MACHINE.

Specifications of Milling Machine Tests.

It was my pleasure to carry out a line of tests as to performance of milling machines, both as regarding feed and speed, at the works of the Cincinnati Milling Machine Co.

The main points to be settled were: *a* How much metal shall a machine of given size be capable of removing? *b* How much power is required for this work on existing machines. *c* Is it possible to improve on the efficiency of present machines and still produce a commercially successful machine? *d* How much power is required for the feed? *e* What is the efficiency of the feed mechanism?

The first question was a point to be decided by the sales manager rather than by the engineer, as it was greatly a matter of competition. As is quite usual in the design of a new line of machines, the desired capacity was placed somewhat higher than that of other makes of similar machines. The customary method is to increase the size of driving pulleys or belt, or the gear ratio, or any combination of these elements. This was not deemed advisable, for two reasons. In the first place, nothing was to prevent competitors from going still further in this matter and so securing a seeming advantage in the sale of their machines without sacrificing anything but a few pounds of cast iron. In the second place, the purchaser of the machine is not interested in the amount of power which he can feed into the machine, but rather in the power of the spindle end, which to him is the business end of the machine.

To determine how much power was required to remove a given amount of metal, tests were made on various machines. The metal to be cut was in all cases, both in these tests and in those to be described later, steel of the following specifications:

	Per cent.
Combined carbon	.16
Silicon	.008
Manganese	.51
Phosphorus	.086
Sulphur	.041
Tensile strength per square inch, pounds	52,738
Limit of elasticity	30,313
Elongation per cent of length	50.0
Per cent reduction of area	54.0

The test blocks used were 18 inches long, 5¼ inches wide and 5½ inches thick. In all tests a spiral cutter with nickel teeth was used, 3½ inches diameter, 6 inches face, and for a 1½-

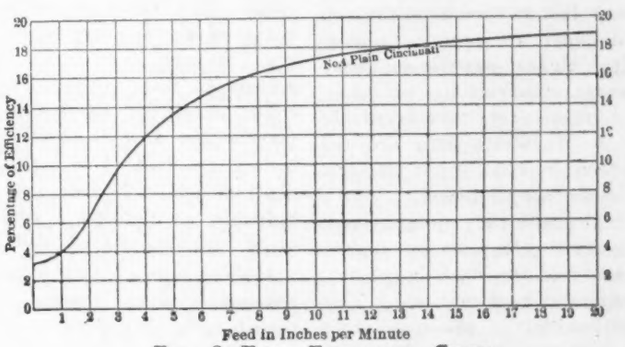


FIG. 8—FEED EFFICIENCY CURVE.

inch arbor. The cutter was driven by a key, and made of high speed steel. All tests were made by driving the machine by an electric motor, belted to the machine. The object was to have all conditions as near as possible to those under which the majority of milling machines have to run, the only difference being that the belt was nearly horizontal instead of vertical. In testing the efficiency of machines in this way the belt must be considered part of the machine. The power consumed was ascertained by reading of ammeter and voltmeter, and the amount of metal removed by measuring width and depth of cut and the amount of feed per minute. The amount of feed, as indicated on the index plate of a milling machine, is generally an approximation, near enough for everyday work, but not for a test. The actual amount of feed was therefore computed from the gearing.

These preliminary tests showed considerable differences in the efficiency of different machines, that is, one machine would cut considerably more material than another for a given amount of horsepower developed by the motor. They also showed that the efficiency of all machines was relatively low as compared to the lathe. This latter might have been expected considering the nature of the cutting tool. As the main problem in a machine shop is not to save power, but to get the greatest possible output, this lack of efficiency cannot be held up against the milling machine as a type, for its other peculiarities make it highly efficient as a producer of work. The fact that one machine is so much more efficient than another is of great importance, however. It shows that the less efficient machines: *a* Use a needlessly large amount of power. *b* Have less capacity than they might have for removing metal. *c* Use a large amount of power constantly for the purpose of breaking down the machine.

It follows that it should be the aim of the designer to produce a machine of the highest possible efficiency as a power transmitter, because—*a* This increases the capacity of the machine. *b* It insures long life and freedom from repairs. *c* It is economical in the use of power.

This high efficiency requirement stands by itself. It must be supplemented, however, by other good features, such as convenience, etc. This paper deals with the efficiency problem only, and that only so far as to show results obtained, rather than the means by which they were obtained.

More complete tests were made after a line of high power millers based on the results of the preliminary tests was developed and completed. These tests were of three kinds: *a* Tests determining the amount of metal removed per horsepower. *b* Tests determining the efficiency of the feed mechanism. *c* Tests determining the efficiency of the driving mechanism.

Power Required to Remove Metal.

The same motor and belt were used for all cutting tests. A series of tests was made, with depths of cut of 1/16 inch, ⅛ inch, 3/16 inch, ¼ inch and ⅜ inch. This complete test was repeated four times. The cutter was sharpened in the ordinary way before starting a complete series of tests, and not resharpened during test. The same cutter, resharpened, was then used for the next machine.

For each depth of cut a number of different feeds were used. In all cases the even feeds were used starting with the second (next to the lowest) and increasing thus: 2d, 4th, 6th, 8th, 10th, etc., up to the highest feed. It was of course impossible to go through the entire series with the deeper cuts, as the belt would slip before the last feed was reached. This slippage of the belt was at all times the end of the test for that depth, except where the entire scale of feeds could be used. Readings were taken, when the belt slipped, but these readings were not used in plotting curves. They served as a check on the belt tension. It was found that the ammeter readings gradually increased from the first to the fourth series. This was probably due to the gradual dulling of the cutter.

In plotting the curves, the test readings were first corrected; the power readings by means of the efficiency chart of the motor; the amount of metal for loss of speed of the machine. The curve as plotted is the curve of the average value of powers. Where the curve shows an amount of metal removed of say 5½ cubic inches per minute this amount may be due to a depth of cut of 1/16 inch and a feed of 16 inches, or to a depth of cut of ⅛ inch and a feed of 8 inches, or perhaps a depth of cut of ¼ inch and a feed of 4 inches.

The amount of power required to remove a given amount of metal varied with the speed, depth of cut and feed per minute, and seems to have a tendency to the minimum when the section of the chip removed per tooth approaches most nearly a perfect square. Figs. 1, 2, 3, 4, 5 and 6 show curves giving the relation between power required and metal removed under different conditions of speed, feed and depth of cut. They are partly derived from the tests described, and partly from tests made for the special purpose of ascertaining these relations. The fact that the power required changes with these conditions of feed, speed and depth of cut made it impossible to plot a single curve giving relation between power and metal removed. Besides, the same speeds and feeds obtainable on one machine were not obtainable on another. And again, the amount of slippage or slowing down of the machine was not always the same for the same amount of metal removed. For this reason the averages have been plotted, and these averages were obtained for the various machines in substantially the same manner. The curves were extended to the zero point, but the high point of all curves is the actual highest average obtained, so that in a certain sense the curves also show the comparison of the greatest possible capacity of these machines. This should be taken as significant, however, only when remembering the conditions under which the machines were tested, and then only as a measure for the maximum driving power.

Power Required for Feed Mechanism.

Tests made by the Cincinnati Milling Machine Co., as well as by other concerns engaged in the manufacture of milling machines, had shown that a considerable amount of power is required for the feed drive of a column and knee type of machine. It was found that as much as 40 per cent of the total power applied might have to be used for the feed alone; and that this could amount to as much as 3½ horsepower on a No. 4 machine. Inasmuch as I did not conduct any of these tests and do not know all of the conditions under which they were made, I do not feel that I can present the results. The main result, however, as far as I was concerned, was the fact that they made me give very careful consideration to the feed mechanism. If 3½ horsepower is used for the feed, and if that feed is 20 inches per minute (the highest feed found on a modern milling machine) then the pressure against this cutter must be

$$\frac{3\frac{1}{2}\times 33{,}000\times 12}{20} = 69{,}300 \text{ pounds}$$

if there are no losses in transmission. Further, it is not likely that the greatest amount of horsepower is required for the feed at its maximum number of inches per minute. It is more probable that the maximum of feed power is used for 10-inch feed or less per minute, in which case the pressure would be in the neighborhood of 140,000 pounds.

A machine using 6 horsepower net for the drive alone (that is, using 6 horsepower at the cutter) would require about 8 horsepower at the pulley for the drive alone, and therefore a total of 11½ horsepower for drive and feed under conditions of feed mentioned above. This is quite a respectable amount for a No. 4 machine. Assuming the cutting speed to be 40 feet, the pressure at the circumference of the cutter must be

$$\frac{6\times33{,}000}{40} = 4{,}950 \text{ pounds},$$

and this must also be the approximate pressure against the table screw, instead of 140,000 pounds. Of course all these figures are assumed, but they illustrate the computations which led up to the second line of experiments to be described here.

In order to determine the efficiency of the feed mechanism, the amount of power used was measured, as well as the amount of work done by the table. As the amount of power required varied widely, and it would be impossible therefore to obtain an efficiency chart for some small motor, covering the entire range of powers used, the idea of using an individual motor for the feed alone was abandoned. Instead the same motor was used as had been used for other tests. The efficiency of this motor was not known below ¼ load. It was then necessary to provide an artificial and constant load for the motor. For this purpose the square box shown in Fig. 7 was mounted on the spindle arbor. It had a paddle inside and a number of obstructions which made the required resistance for the water in the box. By increasing the amount of water in the box, and by giving the paddle various speeds, any load could be produced within the range of the apparatus, anl this load was constant. The box was kept from rotating by resting against the overarm of the machine. The dead load was adjusted until it came within the efficiency curve of the motor. The part of the apparatus used for measuring the work done by the table consisted of a dynamometer, graduated and calibrated up to 8,000 pounds.

One end of this dynamometer was attached to the table of the milling machine. A chain at the other end of the instrument was wrapped around a drum which was mounted on a brake of the Weston type. An arm, mounted on the brake casing and visible in the drawing had at one time been used to determine the efficiency of the driving mechanism, but was not used in this experiment, except to form an abutment for the brake. The brake itself was used only as a safety device, being set at sufficient pressure for the test, but not enough to wreck the machine. The test was carried out as follows: All even feeds were taken, beginning with the second lowest and going up to the highest. For each feed the following pressures were selected: 1,000, 2,000, 3,000, 4,500 and 6,000 pounds. The entire series was repeated once if nothing happened to spoil the test. If something happened to disturb the proceedings, or if something had to be readjusted, then the entire result of the test was dropped and no curve was plotted until two complete series of tests were made without interruption. A sensitive ammeter reading 1/10 ampere was used. The tachometer served to take the speed of the first driving shaft, and all corrections were made as in the test previously described. With a given feed, an entire series of pressures was gone through, after which the amount of feed was changed for the new series, etc.

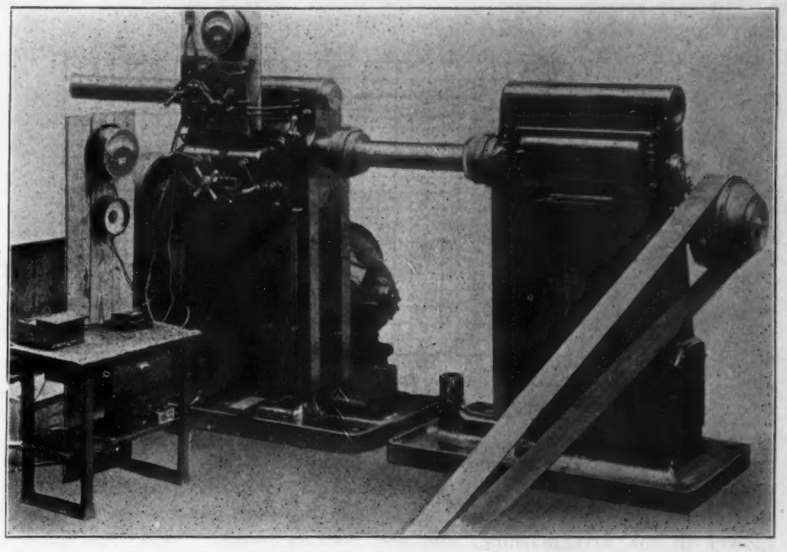


FIG. 9—APPARATUS FOR TESTING EFFICIENCY OF MILLING MACHINE DRIVES.

Before taking a series of readings, the feed mechanism was disconnected to get the reading of the dead load. Another reading of the dead load was taken after each series of readings was completed; that is, after all the different pressures had been used for one single feed. One observer took the readings of the tachometer; another of the ammeter; a third one of the dynamometer, and a fourth one was stationed at the feed starting lever.

Fig. 8 shows the curve of average values plotted from the readings of the test on a No. 4 plain miller. Each ordinate is the average of the ordinates corresponding to a certain amount of feed. The results of these tests justify again the precaution taken to obtain an efficient feed mechanism in the new line of milling machines. It may be mentioned here that these precautions consisted in avoiding idle running gears, high gear velocities, combined torsional and bending stresses in shafts, and ill supported and floating bearings, and above all, in the use of quick pitch screws.

The importance of a higher efficiency in the feed gearing cannot be over-estimated. It may seem that 20 per cent efficiency is still so low that it makes little difference whether it is this amount or something else. It may seem at a first glance that it is of little importance to the user whether 80 per cent or 90 per cent of the feed power is lost in transmission. But a more careful look at this problem shows the importance of high

efficiency very clearly. If three horsepower out of 10 are used for feed on a machine of which the feed efficiency is 10 per cent, then 0.3 horsepower is actually used for this feed. If 10 horsepower is used for the entire machine—that is, for feed and drive—then seven horsepower is left for the spindle drive alone, and therefore the amount used for feed is 3/7 of the amount used for the spindle drive. With a machine having a feed efficiency of 20 per cent or twice as much, the amount of power used for the feed will be 3/14 of the amount of power used for the spindle drive alone, or 3/17 of the total amount used for the machine. If this amount is 10 horsepower again, then the amount used for the feed will be 1.76 horsepower, as against three horsepower in the first machine; and the amount left for spindle drive will be 8.24, as against seven horsepower in the first machine, giving an increased spindle power of 18 per cent available for cutting. Of the three horsepower used by the first machine for the feed alone, 0.3 horsepower is usefully employed while the remaining 2.7 horsepower is employed to wear down the feed mechanism and destroy the machine. Of the 1.76 horsepower used for feed in the second machine, 20 per cent or 0.352 horsepower is usefully employed, whereas the remainder or 1.41 horsepower, is used destructively. It will be seen, therefore, that the power used to break down the machine is almost twice as great in the first machine as it is in the second.

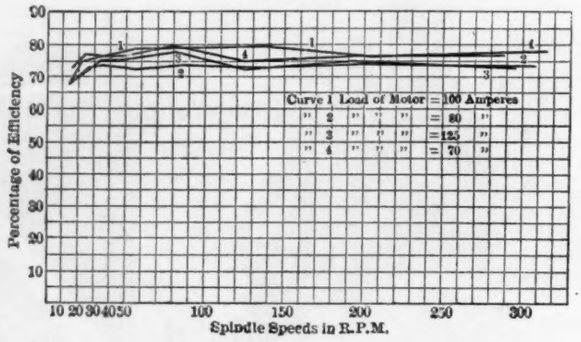


FIG. 10—EFFICIENCY CURVES OF NO. 4 CINCINNATI HIGH POWER MILLER.

Tests Upon Efficiency of Driving Mechanism.

The third series of tests relates to the efficiency of milling machines as power transmitting devices; that is, the ratio of input and output of power. Some preliminary tests were made by observing the power at the spindle by means of an absorption brake of the Weston type; in fact, the same brake as illustrated in Fig. 7. This gave fairly good results at the higher speeds, the torque being small; but at the lower speeds and with greater torque the action of the brake became jerky and it was practically impossible to obtain reliable readings. For this reason the tests were carried on with the apparatus shown in Fig. 9.

This consisted of two machines of the same type, make and size—namely, Cincinnati No. 4 high power miller—placed opposite each other and connected by a stout shaft. The feed works were removed, as were also knee, saddle and table, so that nothing was left but the bare frames and driving works. The machines were placed with the spindles approximately in line. A flange was screwed to the nose of each spindle; each flange was provided with a tongue engaging the groove in the similar flange opposing it, and keyed to the stout connecting shaft. One of the machines was driven by a motor, while the other drove a generator. The current thus generated was dissipated in a water rheostat, by means of which the amount of current could be closely regulated. There was a set of electric instruments for motor and generator each, so that all readings could be taken simultaneously. Both machines were driven by belts. A tachometer was used to determine if one of the belts slipped excessively. If the generator voltmeter showed considerable drop and the tachometer showed about the proper speed at the first driving shaft of the first machine (motor machine) then the belt to the generator must have slipped. If, however, the tachometer showed a drop, then the belt from the motor to the first machine must have slipped.

The speed-controlling levers of both machines were always in corresponding positions—that is, both were set for the same speed, so that at whatever speed the spindle was running, both driving pulleys were always running at the same speed, and that is the speed at which they are supposed to run under working conditions. Different sets of readings were taken. In one set the current consumed was kept at as near 125 amperes as possible. In another set this amount was 100 amperes; in still another, 80, and in the fourth, 70. Each set of tests was carried out over a number of speeds, namely, the lowest, third, fifth, etc., up to the highest but one. After correcting the motor reading for motor efficiency and generator reading for generator efficiency, the quotient of the corrected readings gives the product of the efficiencies of the two machines.

It would be proper to consider the two machines as of equal efficiency if the conditions of load were the same, for these tests did not attempt to establish the efficiency of an individual machine, but of a type of machines and this could best have been done by submitting a great number of these machines to individual efficiency tests and taking the average of the results. It is, therefore, plain that a better result will be obtained by considering at once the two machines as having the same efficiency than to attempt to determine their individual characteristics. It was said that it would be proper to do so if the conditions of load were the same for both machines, but this did not seem to be the case. The load was the same only at the spindle noses. From there on and up to the driving pulley the load increased in the first and diminished in the second machine. The efficiency of the first machine is made up of the efficiencies of its bearings, shafts, sets of mating gears, etc.

It was found, however, on taking the readings that there was such a small difference in efficiency whatever the load, that it seems to be allowable to consider the efficiency as practically constant; in which case the efficiency of each machine equals the square root out of output divided by input. The curves presented in Fig. 10 are based on this assumption. It will be seen that the efficiency of the machine varies from 67 up to 79.7. Various tests made at other times have shown repeatedly efficiencies above those plotted in the curves, but

it was not thought advisable to embody them in these curves, as there were not enough readings to make a complete set and the use of these isolated readings would have a tendency to disturb the effect of the systematic tests.

Efficiency of Cutters of Different Types.

The milling machine is not essentially less efficient as a power transmitter than any other machine tool, but the amount of metal removed per horsepower per minute is low; much lower, in fact, than for the lathe or planer. Were it not for other properties the milling machine could not compete with either of these two machines. It is fortunate for the milling machine that the question of power consumption is of minor importance in considering the purchase of machine tools. Still, it cannot be denied that the milling machine would be esteemed higher if its power consumption could be brought down to the level of the lathe. It is obvious that this cannot be done by increasing the efficiency of the mechanism, as the margin is not large enough to allow of any material improvement. Any substantial increase of efficiency must, therefore, be found in improvements of the cutting tool. With this consideration in mind, some tests were made as to the power required to remove a given amount of metal with different styles of cutters. These tests have not been carried out over a long enough period or with a large enough variety of cutters to give absolutely reliable results, yet, incomplete as they were, they bring out in a startling way the amount of improvement that may be made in this direction.

Cuts made with a spiral cutter with nicked teeth showed a best efficiency of 0.48 cubic inch of metal per net horsepower per minute, and this efficiency was obtained only in a few isolated cuts and with a very sharp cutter. Cuts made with a 14-inch face cutter with inserted teeth and on a No. 4 Cincinnati high power miller showed a production of 0.64 cubic inch per net horsepower per minute, an increase of 33 1/3 per cent over the spiral cutter. This result confirms the general belief that a face cutter cuts freer than a spiral cutter. The teeth of this face cutter were radial, as it is customary to make them. Tests made with the cutter shown in Fig. 11 showed an efficiency of 0.96 cubic inch of metal per net horsepower per minute, and a few isolated cuts even higher. This is an improvement of 100 per cent over the spiral cutter and 50 per cent over the face cutter with radial teeth. The cutter shown in Fig. 12 showed the same efficiency. Both cutters have the blade set tangent to a circle concentric with the cutter, thus giving them a rake angle of 15 degrees. The clearance was 7 degrees. The points of the cutting blades were rounded to prevent injury by burning or chipping, and this reduced the effective rake near the horizontal tangent to this curve. It was for this reason that the blades were set leaning backward as in Fig. 12. But for this curvature at the point of the blades, the simpler construction of Fig. 11 would be perfectly satisfactory. The leaning back of the blades is rather a refinement than a necessary improvement.

It should be borne in mind that the tests made with these cutters were made on a vertical machine which had the same driving parts as a horizontal machine of the same size, and besides an additional two shafts and four gears, so that it is safe to say that its mechanical efficiency must be less than that of the No. 4 horizontal machine used with the spiral cutter with nicked teeth. The action of the feed on a machine using this cutter may be somewhat different from that on a machine using spiral cutters. Whether there is such a difference and what it amounts to has not been ascertained by tests, and might be a promising field to explore. The fact that, generally speaking, the face cutter with rake removes double the amount of metal with the same amount of power as compared to the spiral mill is significant and places the vertical machine in the front rank for slabbing work wherever it is possible to use this type. Equally significant is the fact that a cutter with rake removes 50 per cent more metal than a cutter without rake. It may be mentioned here that many of these cutters, especially for so-called rotary planers, are being made and have been made for a great many years with the teeth leaning backward as in Fig. 12, but without rake; the makers and users apparently believing that this leaning constitutes rake.

I regret that the requirements of patent laws do not permit me at the present date to describe a spiral cutter and a face cutter built on different principles, which have been tested as to their efficiency. It may be of some interest, however, to know that a great number of cuts have been taken with these cutters showing removal of 1.14 cubic inches per net horsepower per minute, and with entire absence of chattering of machine and spring of the cutter arbor.

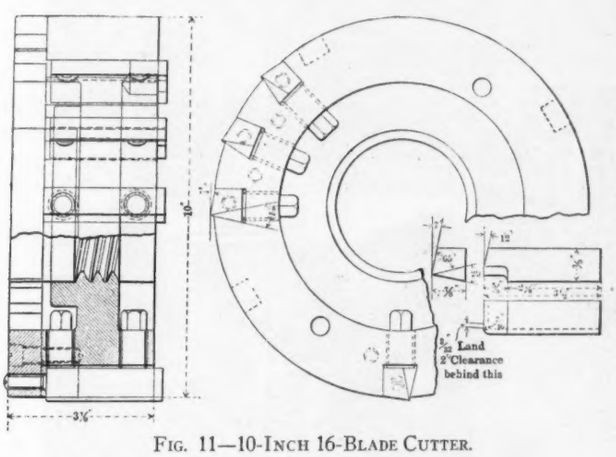


FIG. 11—10-INCH 16-BLADE CUTTER.

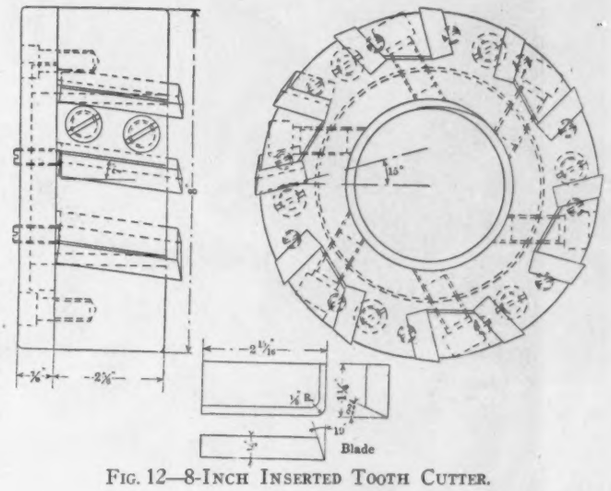
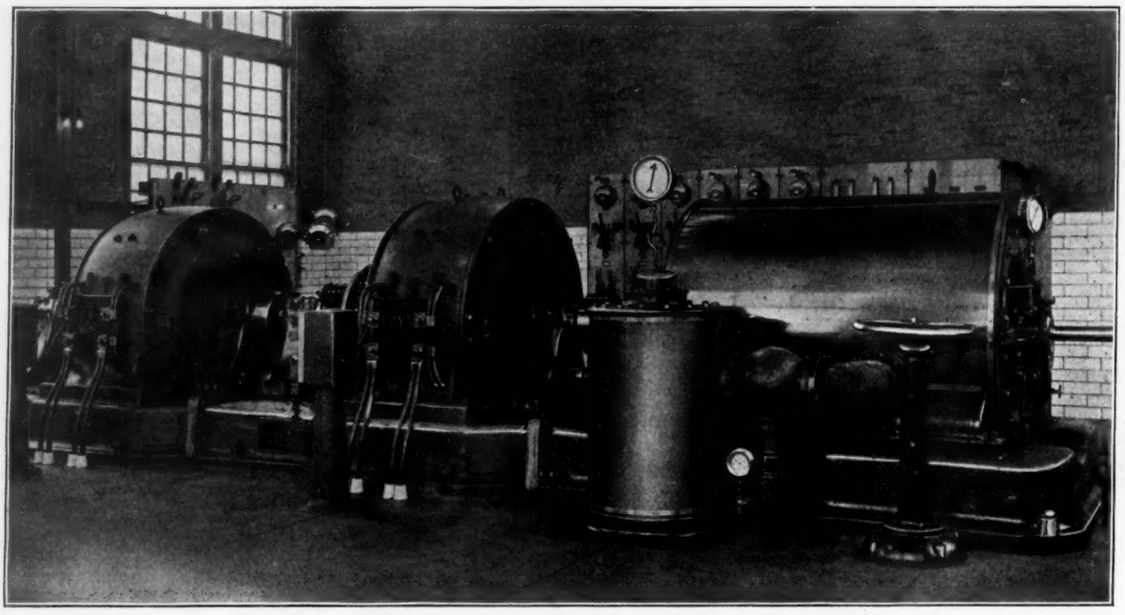


FIG. 12—8-INCH INSERTED TOOTH CUTTER.

A LOW PRESSURE STEAM TURBINE PLANT.

At the mills of the Wisconsin Steel Co., South Chicago, there is installed for the utilization of exhaust steam from the blooming mill engines a 1,000-kilowatt turbo-generator set, the first low pressure unit of this character operating on exhaust steam to be put in service in this country. The turbine is of the Rateau type built by the Western Electric Co. The generators, of which there are two, as shown in the accompanying illustration, were especially designed by the Western Electric Co. for this plant and the mill engine from which steam is exhausted to the turbine is of the double cylinder reversing type, with a normal capacity of 1,000 horsepower.



Low Pressure Turbine Set at Wisconsin Steel Co. Plant.

If the total work per hour were distributed evenly over the hour, the average indicated horsepower would be 820. The steam consumption is then 64 pounds per average indicated horsepower hour, or 54 pounds during the running period. The high steam consumption is explained by the fact that the engine takes steam through practically the full stroke when starting the passes through the mill, running on light load most of the remaining time.

The steam from the engine exhaust passes into a receiver for the turbine, which acts as a muffler and pressure equalizer. This receiver connects with an accumulator and the turbine, and is regulated by means of an exhaust valve into the atmosphere, so that the proper pressure is maintained in the receiver to meet the demands of the turbine. The accumulator or regenerator consists of a horizontal tank divided into two decks, each deck being fitted with a series of flues, which allow steam to pass freely between the decks. The action of the accumulator is explained as follows: Operating at practically atmospheric pressure, there is surrounding the series of pipes in the accumulator a large mass of water at 212 degrees Fahr. The exhaust steam passing through these pipes, the ends of which are perforated, is partially condensed, giving heat to the water which becomes a storage reservoir for the heat. When the engine stops and the exhaust steam supply is temporarily cut off, the pressure on the water is reduced by the action of the turbine condenser. The accumulator, under less than atmospheric pressure, becomes a steam generator through the vaporization of the water at 212 degrees. This action will supply sufficient steam to the turbine for seven minutes running, and should the engine be shut down for a longer time a live steam connection through a reducing valve is provided. The vaporization of the accumulator water robs it of its stored heat and leaves it in a condition to again take heat from the exhaust steam.

The turbine is of the Rateau type and is of a design to provide unusual strength. Its wheels are turned from solid steel plate and the buckets are of a non-rusting alloy. Each bucket is riveted to the rim of the wheel by specially designed rivets. The velocity of the steam is moderated by the use of a large number of stages and the wearing effect of the impinging jets is reduced to a minimum. The speed of the turbine is controlled by a spring balanced fly-ball governor, which operates a throttle valve located in the vertical cylinder shown in the illustration. This throttle valve, owing to the low pressure of the steam used, is made very large, and a very sensitive regulation is obtained. A condenser and air pump are used in connection with the installation, a vacuum of about 28 inches being maintained.

The generators are mounted on the single main shaft, and each has a normal capacity of 250 kilowatts when operating at 250 volts. The armature is of the ordinary iron-clad type, but built much stronger than usual. Due to the high peripheral velocity common to turbines and the high coefficient of expansion in long commutator bars, the diameter and length of the commutator is limited. To avoid any possible trouble, the commutator is divided into two parts connected by means of tangs. The fields are of the usual type standard in direct current machines, commutating poles being used because of

the high speed and large current. The armature is kept cool by means of fan blades attached to the armature and to prevent noise so common in high speed machines. The frames are enclosed in end bells. The overload capacity of these machines is such that the entire load of the turbine plant has been carried by one of the two machines.

During three months when the steel plant was running at nearly full capacity, the turbine delivered an average of 188,300 kilowatt-hours per month, or 51 per cent of the total possible kilowatt-hours if run at its rated load the entire time.

The operating expenses are at the following rates, based on the above output:

	Cents per kilowatt-hour.
Oil, waste, etc.	0.002
Attendance	0.074
Maintenance and miscellaneous	0.011
Total operating	0.087
Fixed charges	0.212
Total cost	0.299

The fixed charges are figured on the basis of a cost of $80 per kilowatt. This figure would, of course, vary considerably with the conditions, but it can be taken as an average for moderate-size plants. Interest, depreciation, etc., are allowed for at 12 per cent. Nothing is allowed for superintendence, as no additional force is required for this item.

The cost being made up so largely of fixed charges, it varied very markedly with the load-factor. In fact, if the plant is run 24 hours a day, the lubrication, attendance, and maintenance are only affected to a slight extent by the amount of load, so that they have almost the same effect as a fixed charge. Of course, if the plant were run only during the day shift, the operating expenses would go down.

The following are the principal results of four tests on the turbine plant run in March, 1907:

	1.	2.	3.	4.
Turbine:—				
Average pressure above controlling valve, inches	32.9	32.4	30.93	29.75
Average pressure under controlling valve, inches	18.6	19.0	21.47	24.85
Average vacuum at exhaust casing, inches	25.31	26.6	26.95	26.40
Average revolutions of turbine, revolutions per minute	1,540.0	1,540.0	1,500.0	1,500.0
Average brake horsepower at turbine shaft, horsepower	409.0	544.0	727.0	869.0
Generators:—				
Average current delivery in kilowatts, kilowatts	266.1	366.7	489.2	591.6
Average efficiency of generators, per cent	90.2	90.2	90.2	90.2
Average horsepower at the switchboard, horsepower	369.0	491.0	656.0	784.0
Derived Results:—				
Steam per minute to turbine, pounds	326.0	337.0	367.5	488.0
Steam per kilowatt-hour, pounds	73.3	55.2	45.2	49.5
Steam per horsepower at switchboard per hour, pounds	52.8	41.2	33.6	37.3
Steam per brake horsepower at turbine per hour, pounds	47.7	37.1	30.7	33.7

The furnace of the Bird Iron Co. at Ironton, O., will be blown in this week. The coke supply was contracted for during the past week.

APPLICATION OF THE STORAGE BATTERY TO AUTO TRUCKS.

By solving in an eminently satisfactory manner its own problem relative to the economical transportation of material about various parts of its works, the Westinghouse Machine Co., Pittsburg, has found itself in a position to present the benefits of its experiments to the general manufacturing public. The company has so successfully applied the use of the storage battery in an industrial auto truck of its own design, that it has standardized the constructive features and is now offering upon the market the trucks from 10 to 40 tons capacity.

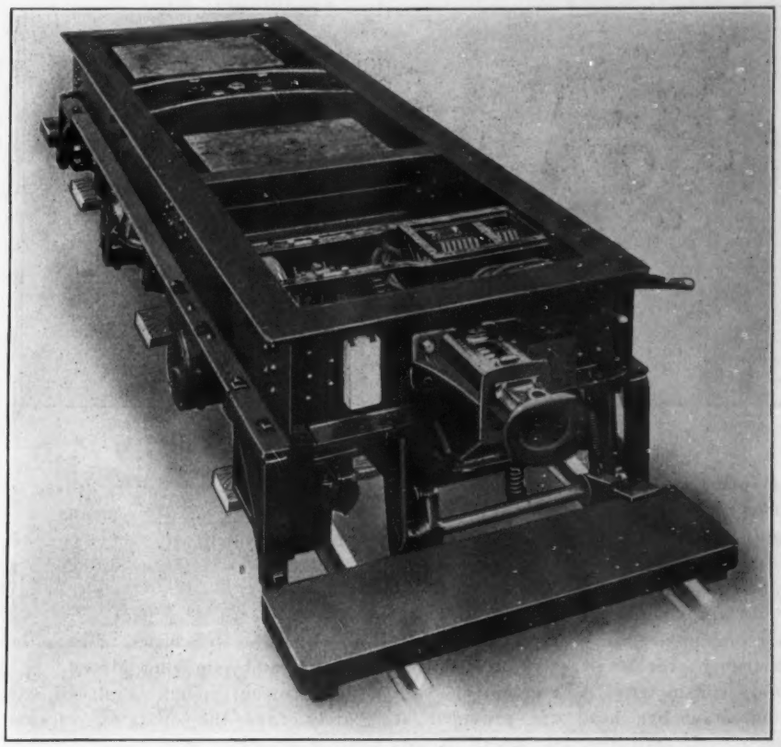


FIG. 1—WESTINGHOUSE AUTO TRUCK WITH DECK REMOVED, SHOWING LOCATION OF BATTERIES AND CONTROLLER.

The system previously in use in the Westinghouse machine shops consisted of numerous small cast iron trucks of 3-foot gage, running on tracks which extended along and across the different aisles of the works, the tracks being connected by turntables. The cars were moved by hand; the load necessarily restricted to a few tons. Heavy castings were moved by means of four-wheel 50-ton trucks of standard gage across the storage yard to the machine aisles, and from there to the erecting aisles, to be handled by the cranes. These trucks were usually moved by a rope passing under a snatch block and attached to a crane hook.

Improvement to Crane Service.

The immediate result of the installation of these auto trucks was surprising in the extreme. The improvement in the crane service was particularly marked, as a crane was no longer used for transporting castings below 10 tons in weight from one end of the long shops to the other, driving several cranes before it and putting them temporarily out of commission. The number of laborers required for moving material was reduced, and in addition the delays of material in transit were largely eliminated.

Although these trucks are of simple

construction, they are substantially made of the best materials. A steel frame, thoroughly braced, is carried on four wheels, the journals of which run in roller bearings. The driving axle or axles, as the case may be, carry the motor or motors, as in street railway practice. The motor

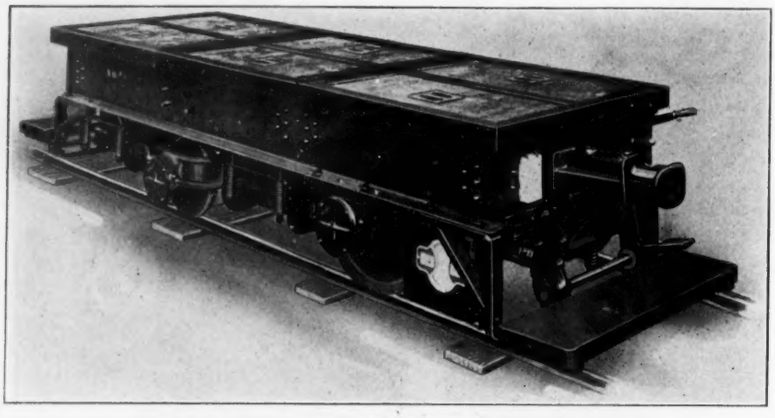


FIG. 2—GENERAL VIEW OF WESTINGHOUSE AUTO TRUCK.

is spring-suspended from the frame at one end, and connected to the driving axle by suitable reduction gearing. A spring-suspended cradle of angle iron carries the battery trays.

At the operating end of the truck are mounted the controller, brake, charging receptacle, cut-out switch and volt-meter. A convenient step and draw bar head are provided at each end. All the machinery is below the top of the frame and is covered by a heavy wooden deck for carrying the load. This deck is made in sections, so that any part of the mechanism is readily accessible.

The motor is of the Westinghouse vehicle type, capable of standing heavy overloads, is dust proof and self oiling. The controller is of the Westinghouse vehicle type, giving four speeds in either direction. It is provided with operating and reverse levers, which are interlocking to prevent premature reversal, thus protecting the motor and the batteries.

Battery Especially Designed.

The battery, which is of the Plantee type, especially constructed, is contained in two or more trays of cells, and is of ample capacity for this particular service. It is especially designed to operate at high rates of charge and discharge, and therefore a battery of four or five times the capacity, as is usually the practice, is not needed, since the plates in this battery are capable of discharging at a very high rate for three or four minutes at a time without injury. Another reason for adopting a battery of smaller ampere-hour capacity than is customary in similar work, is that the time available for charging during the working hours is usually thrice the period of time that the truck is actually running. Charging is made so simple that the truck can easily be charged during these idle periods. This feature means a reduced investment and a large saving of interest and depreciation charges. The system of connecting the cells and the use of deep jars reduce to a minimum the difficulties of examining, cleaning and removing plates.

The cut-out switch is placed immediately over the charging receptacle and is provided with a key so that it can be set in any position and left there without danger of tampering. The charging receptacle is made to receive any one of several plugs connected to cables located at different points about the works.

For normal conditions of charge there should be located at convenient stations, directly connected to a circuit supplying direct current 220 or 110 volts, as the case may be, one two-pole, single-throw switch, and front connections with enclosed fuse holders, connected to the charging plug with a flexible cable. For the periodic gasing of the battery, there will be required a charging panel with rheostat.

The volt-ammeter is mounted at the front end of the truck where it cannot be easily injured. By its use the condition of the batteries and the mechanical condition of the truck may be observed. It also indicates when the maximum safe load that the truck should carry or haul has been reached.

The Mechanical Details.

The main journals run in roller bearings of standard and well known construction. The motor and counter shaft journals run in removable bronze bushings.

The motor bearings and main journals are self-oiling, while the minor bearings are lubricated by means of grease cups. A single adjustable band brake operated by a foot lever, is provided. The wheels are standard chilled cast iron, M. C. B. construction when used on double motor trucks. The driving wheels of single motor trucks are of cast steel with ground tread to secure maximum adhesion.

It will be seen from the front view of the standard 10-ton truck that there are but three levers, operating, respectively, the controller, reverse and brake. There are four evenly divided speeds forward and backward.

The plug, which is connected to a 110 or 220-volt circuit at charging sta-

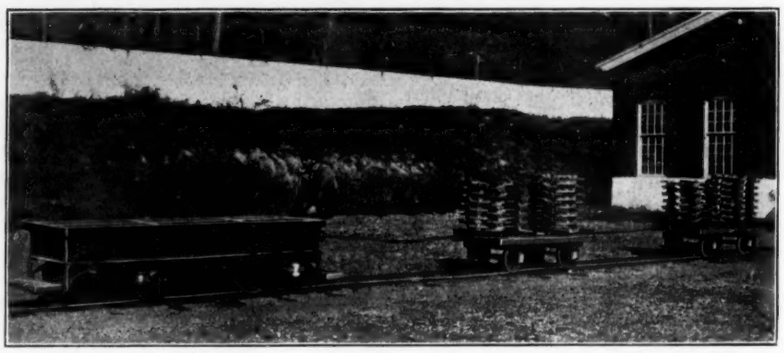


FIG. 3—WESTINGHOUSE AUTO TRUCK USED AS LOCOMOTIVE.

tions, is inserted in the socket located under the frame and to the left of the draw bar head. The key is inserted in the slot above the socket, set to charging position, and then removed. The truck is left charging until it is again required. At the beginning of a charge the rate is high, but it automatically cuts itself down until practically no current flows.

During a six months' test of the standard 10-ton truck herein illustrated, the power required to charge the battery in regular and heavy shop service was accurately metered. It averaged 63 kilowatt-hours per month. At the high figure of 5 cents per kilowatt-hour, the cost for the current would be only $3.15. The work done was recorded and averaged practically 700 ton-miles per month, the loads running from a few hundred pounds to 15 tons.

Employed as Locomotives.

These trucks used as locomotives on a level track and without any weight to secure adhesion can haul, on suitable cars, from one-half to their full rated capacity as a truck, depending upon the condition of the track and kind of bearings on the cars hauled. By placing sufficient weight over the drivers to secure adhesion, they are capable of handling from one to two times their capacity as a truck for a continuous period of not more than five minutes. An interesting application of their use in this respect is shown by Fig. 3, which shows several swivel type trucks of 10 tons capacity operating in the frog and switch department of the Pennsylvania Steel Co., Steelton, Pa.

A later development is in the swivel type truck, constructed with front wheels smaller than the main driving wheels, and attached to a swiveling bolster, that the truck may freely operate on curves as low as 12 feet radius. With this type of truck turntables are unnecessary. This swiveling arrangement is so provided with anti-friction ball bearings that energy consumed in this member in rounding curves is negligible. The swivel type of truck is made for gages of 36 inches and narrower, only. For use on tracks of the well known Hunt system, wheels are provided with outside flanges.

Some Important Installations.

The Westinghouse company now has in use for its own service two 40-ton trucks and five 10-ton trucks in its machine shop, and two 10-ton trucks in its foundry. Some of the other installations are three 10-ton swivel trucks on a 21½-inch gage track in the frog and switch department of the Pennsylvania Steel Co., Steelton, Pa.; a 10-ton truck for a 24-inch gage track in the Omaha shops of the Union Pacific railway; and a 20-ton truck for a 4 feet 8½ inches standard railroad gage track for the Allis-Chalmers Co., Milwaukee.

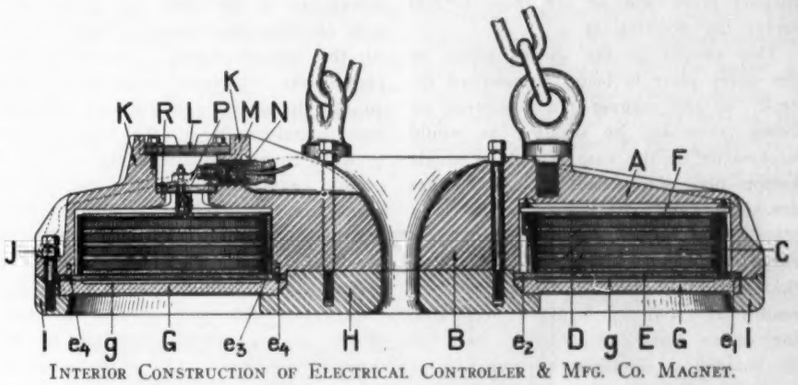
RECENT IMPROVEMENTS IN LIFTING MAGNETS.

The first commercially successful lifting magnet for handling pig iron, scrap and miscellaneous magnetic material is stated to have been placed on the market by the Electric Controlller & Mfg. Co., Cleveland, in March, 1905. This magnet was built in two sizes, commercially known as No. 1 and No. 2, type S magnets. Over 150 of these magnets have since been placed in service, and at a conservative estimate, saved to the iron and steel trade of this country at least half a million dollars in the cost of handling material within the past year.

In view of these facts there can be no doubt that these magnets have become satisfactory and reliable tools. Unquestionably a successful lifting magnet must withstand in service more severe abuse and rough handling than any other type of electrical apparatus. In operation it is suspended from the hook of a crane, frequently not equipped with a lowering brake, and may be dropped at high speed upon the material to be lifted. In service it will be swung against cars, charging boxes, piles of pig iron, etc., and must be capable of withstanding the blows and shocks which result. It must operate under all weather conditions, and its insulation must withstand a voltage much higher than the line voltage, due to the inductive kick which occurs when the circuit of the magnet is opened. Its winding must not be injured by the large amount of heat which is necessarily generated within it, but preferably also should not be damaged by external heat when the magnet is called upon to handle hot material.

The accompanying illustration is a typical cross-section of a new type S. A. magnet and shows the arrangement of parts which has been found to meet the severe and exacting requirements of service. In the illustration, A is the body of the magnet, being an annular casting of special electrical steel heavily ribbed on both its upper and outer surfaces. The ribs serve to add largely to the surface available for dissipating heat and stiffen the magnet case mechanically. At the same time they add to the cross-section of the magnet circuit.

B is the core of the magnet, which is surrounded by the winding C. This winding is composed of a series of coils each wound with a conductor in the form of a copper ribbon or strap, the turns of which are insulated with asbestos ribbon. Neighboring coils are mechanically separated and electrically insulated by non-combustible insulating discs D. The coils are wound upon a brass form E which resembles a spool with one head removed. This form serves to support the coils during the process of winding and insures coils of uniform shape. After the uppermost coil is wound and the outer disc of insulation in place, the entire winding is rigidly clamped to the form by means of radial straps F, thus making the winding and the brass form which carries it a rigid unit. The completed winding is then dried in a steam heated chamber under a vacuum and then is impregnated with a plastic insulating compound. This results in a winding which is both fireproof and waterproof. The completed winding is then placed in the magnet case.



INTERIOR CONSTRUCTION OF ELECTRICAL CONTROLLER & MFG. CO. MAGNET.

The form E is provided with an outer flange e_1, and an inner flange e_2 in addition to the central flange e_3 which supports the winding. The inner and outer flanges are finished and engage with finished surfaces on the inner and outer pole faces of the magnet case, thus completely sealing the lower face of the winding chamber, a water-tight joint being insured by clamping the flanges in place with screws e_4, spaced 4 inches apart entirely around the flanges e_1 and e_2. Since the winding is clamped to the form E by the radial clamps F and the form E is clamped in the magnet case

by the screws e, the winding is rigidly held against displacement.

With the winding thus assembled in the magnet case, the lower face of the coil form E is covered by a heavy annular plate of non-magnetic manganese steel G, in turn held in place by pole shoes H and I, bolted respectively to the inner and outer poles of the magnet case. Both of the pole shoes are provided with shoulders which protect the clamping bolts from shearing strains. The heads of the outer clamping bolts J are located between adjacent ribs on the outer surface of the magnet case where they are protected from abrasion.

The manganese steel plate G carries raised shoulders around its inner and outer peripheries by means of which the plate is made to seat against the magnet poles and an air space is left under the winding at g.

This results in the shocks taken by the outer plate G being transmitted directly to the magnet frame instead of being taken by the winding as would necessarily be the case if only a single bottom plate were used. The pole shoes are so disposed with respect to the outer plate G that none of the clamping surfaces can become battered over and, therefore, the plate G may always be readily renewed. It will be seen that the entire lower or wearing face of the magnet is renewable and that these renewals can be readily effected in the field, there being no necessity of in any way exposing or disturbing the winding or breaking the water-tight joint between the coil form E and the frame of the magnet.

The arrangement of terminals also deserves attention since, no matter how good the design in other respects, if the terminal construction be weak, trouble is certain to result from this cause.

In this type of magnets the terminal cavity is surrounded by raised walls, K, K, cast integral with the magnet case and of such thickness as to be as strong as the magnet case itself. The terminal cavity is closed at the top with a steel cover L, which seats against a gasket to form a water-tight joint and is firmly bolted in place, the heads of the bolts being protected from abrasion by the walls of the terminal cavity. All of the terminal parts are thus enclosed in a water-proof box. The terminals themselves are of the plug type which permits of quick attachment and detachment of the service wires. Numerous improvements, however, have been made in the details of construction. The female members M of the terminal are enclosed in an insulating tube so that a ground cannot result even if the service wires are left hanging from the crane with current on. The insulating tubes are each encased in a steel tube to prevent abrasion of the insulation and these steel tubes fit closely in babbitted openings N in the side of the terminal chamber. The male members P of the plug connectors are mounted upon a plate R of fireproof insulating material which closes the entrance to the winding chamber and is seated upon a gasket to effect a water-tight joint. The plugs proper are separable from the terminal by removing the nuts which hold them in place. The plugs and also the plate R may therefore be removed without throwing any strain on the connections to the winding, the connections consisting of loops of flexible copper ribbon, these loops being stowed away in the ends of the terminal studs.

These magnets are stated to possess maximum efficiency in handling material, by which is meant the ability to handle the largest amount of material in a given time with minimum total consumption of current. As an instance, the No 4 type S. A. magnet, 40 inches diameter, lifts substantially as much as older forms of magnets of 50 inches diameter with substantially the same current consumption, but it weighs 2,000 pounds less. Comparing the performance of the two magnets on a five-ton crane having a 25-horsepower hoist motor, with equal lifts, the No. 4 S. A. magnet has the advantage of 2,000 pounds in total load to be lifted or 20 per cent of the total hoisting capacity of the crane. This will mean a saving in current consumption of 20 amperes on the part of the hoist motor, and by virtue of this lower current consumption and lighter load the hoisting speed will be higher and the amount of material handled in a given time will be materially increased. Proportionable increases in efficiency are shown by the No. 5 and No. 6 type S. A. magnets.

A NEW RIDGWAY SIDE CRANK ENGINE.

The Ridgway Dynamo & Engine Co., Ridgway, Pa., has recently brought out a new line of side crank engines, some features of which are illustrated herewith. This engine has been designed for simplicity, strength and interchangeability, wherever possible. The bed is of heavy design throughout, with the metal so distributed as to bring the heaviest sections in line with the greatest strains. The main part of the bed is of box section with bored guides of large diameter. The guides and the end for the cylinder are bored and turned at one setting on a special machine, thus insuring perfect alignment of the bed and cylinder. At the cylinder end of the bed is a removable partition provided with sectional packing around the piston rod to prevent oil being thrown against the end of the cylinder. Between the cylinder and the partition is a well, in which the drip from the stuffing box is caught. Water is removed from the oil by a separator, the oil flowing back to the crank pit. The crank disc is covered with an oil tight guard of light sheet steel, hinged at the top, so that it may be turned back over the bed, giving access to the connecting rod and crank pin.

The main bearing on all sizes is of the quarter box type, the shells being lined with babbitt. Horizontal adjustment is secured by a wedge and vertical adjustment by drawing down the cap. The top and bottom shells are interchangeable and may be easily and quickly removed without taking the shaft from the bed.

The connecting rod is forged from open-hearth steel, and is designed with a factor of safety of 15, to insure ample strength under the most severe operating conditions. The straps at both ends are slotted from the solid forging. Both ends are adjusted by the wedge and bolt method. The cross head body is of cast steel with shoes of cast iron, faced with babbitt. The upper shoe is bolted solid, while the lower shoe is adjustable. Means have been provided for adjusting both top and bottom shoes by the use of shims, should this adjustment prove necessary. The wrist pin is tapered to fit seats in each side of the cross head body, and is provided with keys, so that it may be turned 90 degrees as it wears.

The cylinder and valve of the new

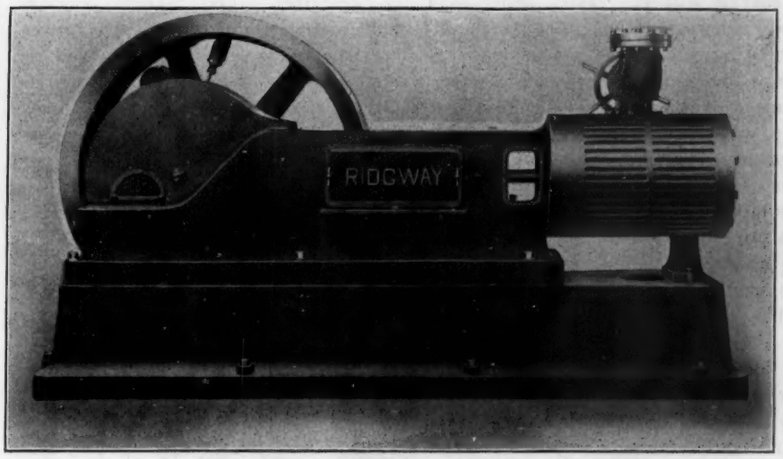


FIG. 1—THE RIDGWAY SIDE CRANK ENGINE.

line of engines are the same as have been employed on this company's center crank engines. The valve is of the flat balanced type, moving between the seat and a heavy pressure plate. In the pressure plate are cored parts, corresponding to those in the valve seat and connecting through side openings with the main ports, thus making a double-ported valve. The pressure plate is held in place by lugs on the edges and a spring on the back. In case of water being carried into the cylinder, both valve and pressure plate will lift from the seat, allowing the water to pass into the exhaust, relief valves being unnecessary. The piston is a single hollow casting, strongly ribbed and packed with cast iron snap rings. The rod and piston are joined by a force taper fit, supplemented by a jam nut. The rod screws into the cross head, and is prevented from turning by a jam nut, which is further held by a set screw in the cross head body.

The main shaft is a single forging, which is extra large in the bearings, and is proportionately increased in the governor wheel hub. The crank disc is of semi-steel, on which the crank pin is cast solid. This construction is adopted, because of the large size of the crank pin and the shaft at the crank fit. Had the pin been made separate, the metal between it and the shaft would not have had sufficient strength to withstand the heavy strains to which it is necessarily subjected. The shape of the disc is such that good counterbalancing is obtained.

A feature of the engine on which the maker lays great stress is the governor, which is of the inertia type. It comprises a long bar called the "inertia bar," with weights at each end and pivoted at the center on a roller bearing. The inertia bar is lined with hardened steel bushings, and the space between the main pin and the bushings is filled with hardened steel rollers, which insures a minimum of friction and subjects the bearings to but little wear. To the hub of the bearing is clamped the eccentric, which is keyed in place and held by set screws. A heavy coil spring is secured to the middle of one end of the bar. Opposite the spring is an oil dash pot, the piston of which is connected to the inertia bar. A by-pass with an adjustable opening allows the oil to circulate from one side of the piston to the other. When the governor is rotated, the weight on the spring end of the bar tends to move outward and backward to a stop. This tendency is balanced by the spring, whose tension is such as to hold the inertia bar in equilibrium when the engine is at the desired speed. When starting the engine the eccentric travels in its greatest path, giving the valve its widest opening and latest cut-off. As the speed increases, centrifugal force, acting on the weighted end of the inertia bar, moves it backward, reducing the travel of the valve and cutting off the steam earlier. The backward movement of the bar continues until the travel of the valve reduces the cut-off to the amount necessary to keep the engine rotating at its proper speed to give an even balance between the centrifugal force acting on the inertia bar and the opposing tension of the spring. On applying a load to the engine, the speed of the governor wheel is checked, while the inertia bar, by reason of its momentum, rotates forward sufficiently to increase the valve travel, thus lengthening the cut-off, enabling the engine to carry the greater load. Should the load be thrown off the governor wheel tends to increase its speed, causing the inertia bar to swing backward and reduce the valve travel

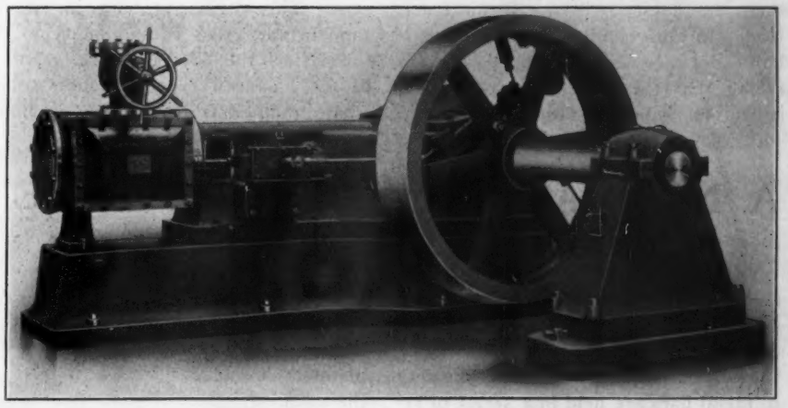


FIG. 2—VALVE SIDE OF RIDGWAY SIDE CRANK ENGINE.

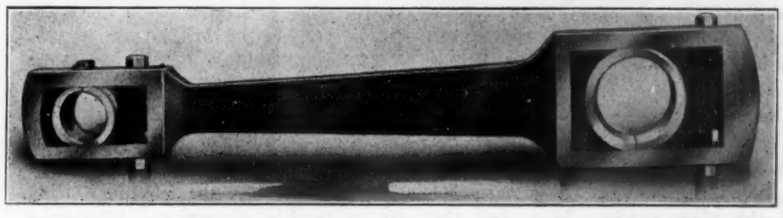


FIG. 3—CONNECTING ROD OF RIDGWAY ENGINE.

and cut-off until equilibrium is established, as before. It is evident that the speed of rotation, under a steady load, depends entirely upon the equilibrium between the centrifugal force acting on the inertia bar and the tension of the governor spring, while the actual movement of the governor parts is accomplished by the inertia of the weighted ends of the bar. If the weight in the inertia bar and the tension of the spring are so adjusted

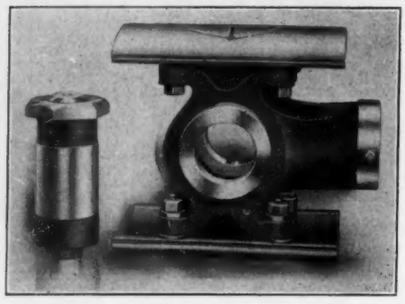


FIG. 4—CROSS HEAD OF RIDGWAY ENGINE.

that the centrifugal force increases faster than the tension of the spring, then the engine will speed up under load. In this condition, the engine is liable to race and it is to prevent racing that the dash pot is used. It is thus possible to adjust the engine so that it will run faster under load than when running light, and still have it regulate with no tendency to race. The governor may be likewise adjusted to run slower unler load than with no load. No difficulty has been experienced in adjusting the engine to govern within a limit of one revolution. The instantaneous variation of speed, when the entire load is thrown on or off, is less than 2 per cent.

The outboard bearing is supported on a heavy pedestal broad at the base to insure stiffness. The bearing is of the self-oiling, self-aligning type, the shells being lined with babbitt. The self-aligning feature eliminates outboard bearing troubles, due to defective and bad alignment. Vertical adjustment is accomplished by means of a special device applied to the four holding down bolts at the base of the pedestal, while horizontal adjustment is made by ordinary set screws in the sub-base. Two systems of lubrication are used, either the "splash system," or a system of forced lubrication in connection with a valveless pump driven by a cam on the valve gear ram. The engine is built in simple, tandem and cross compound types. In the latter, the low pressure valve is of the balanced type, although somewhat modified from the one previously described. On tandem engines, both valves are driven by the governor, the low pressure directly and the high pressure by means of a tail rod on the low pressure valve. On cross compound engines, the high pressure valve is driven by the governor, and the low pressure valve by a fixed eccentric on the main shaft. Otherwise,

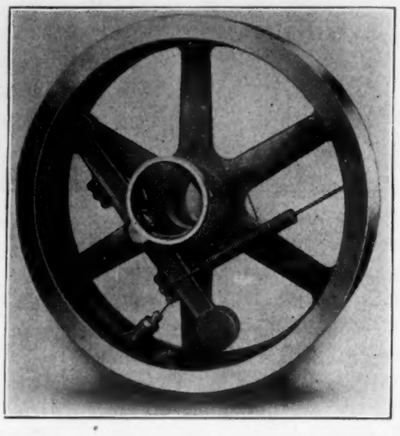


FIG. 5—GOVERNOR OF RIDGWAY ENGINE.

the valve gear is identical for each cylinder. The simple and tandem compound engines are built in capacities ranging from 50 to 800 horsepower, and the cross compound engines up to 1,500 horsepower.

A NEW AUTOMATIC MULTIPLE SPINDLE LATHE

The accompanying illustrations show features of an automatic multiple spindle lathe recently devised by the Peerless Automatic Machine Co., Cleveland. In this machine a plurality of metal bars are held in a series of revolving spindles, equidistantly spaced about a common center in an intermittently rotatable head, automatically and simultaneously operated upon by a number of metal cutting tools.

General Features.

Figs. 1 and 2 show the front and rear sides of the machine. The head stock carrying the spindle head and the bed frame are cast as one piece, and the bed frame rests on three points upon a pan, which catches the cutting lubricant, chips and products. The chips and product are retained by the pan while the lubricant is strained into the pedestal which supports the spindle end of the machine and forms an oil reservoir.

Power is supplied to the stock carrying spindles and the thread cutting spindles by the pulley A, through the central power shaft. The operating and regulating cams are driven by the high speed pulley B set at right angles to the cam shafts. All means of adjustment are placed on the outside of the machine where they are readily accessible.

The wire feed adjusting bar carrying the adjusting screw is shown at the extreme left of Fig. 1. Next in order, proceeding towards the right, are the spindle head locking bolt C with its tension spring and adjusting nut; the adjusting screw D, and the stop screw for the front transverse tool slide; the stock length gage E with its adjusting screw at the right end of the longitudinal tool slide, and the squared end F of the drive worm shaft, to receive a crank handle by which the machine may be operated by hand while setting the tools.

The disk G, right end of Fig. 1, carries the cams which regulate the thread cutting spindles. Next to it are the speed regulating dogs which control the slow cutting feeds and the rapid return feeds and other intervening movements.

In Fig. 2, the thread cutting spindles H, are shown in front of the longitudinal tool slide with all adjustable parts conveniently placed. The adjusting screw and the stop screw for the rear transverse tool slide are shown at J, and the adjustable operating cams for both transverse tool slides appear at K near the middle of Fig. 2.

The great accessibility of the machine is most clearly shown by the unobstructed space reserved for the tools to be secured to the longitudinal and transverse tool slides. The oil pump is gear connected to the worm driving shaft.

Operating Mechanism.

The spindle head carries five spindles L, of crucible steel which run in phosphor bronze bearings, the front bearing having the standard taper, with means of compensation for wear. Oil is supplied to the spindle bearings by a double system of lubrication.

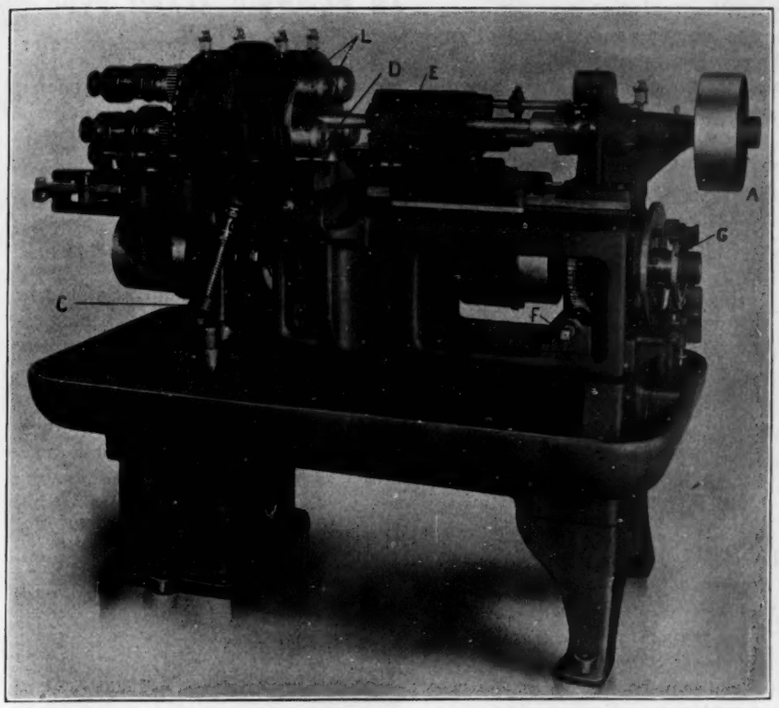


FIG. 1—FRONT OF PEERLESS AUTOMATIC MULTIPLE SPINDLE LATHE.

The oil chambers *a* and *b*, Fig. 3, between the front and rear bearings are provided with means for filling independent of the glass oilers shown in Figs. 1 and 2, although the oil from these oilers drains into the oil chambers after passing through the bearings and helps to keep them filled.

The stock chucking and feeding mechanisms are similar to those that have now become standard for machines of this class. The adjustment of the stock feed, previously referred to, operates through the adjusting bar and the adjusting screw shown in Fig. 1.

This adjusting bar introduces a greater or less amount of lost motion between the feeding lever shown at the extreme right of Fig. 2 and the cam roll lever directly to its left, so that the feeding cam need never be removed or adjusted. Since the stock feeding is effected while the cutting tools are operating, no time is lost by virtue of this lost motion.

The locking of the spindle head into position after each partial revolution is effected by a novel and improved locking bolt, with which the accurate positioning of the spindle head does not depend upon the nicety of the fit that the cylindrical part of the locking bolt has in the locking bushing *e*, Fig. 3. The tapered end of the locking bolt engages a conical recess divided on its longitudinal axis. One half of this divided recess is integral with the locking bushing *e*. The other half of the recess is formed by the locking plugs *d* carried by the spindle head

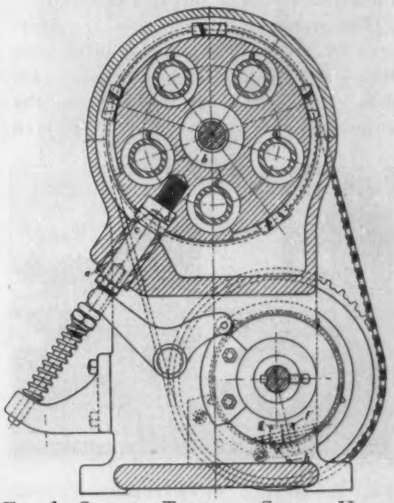


FIG. 3—SECTION THROUGH SPINDLE HEAD.

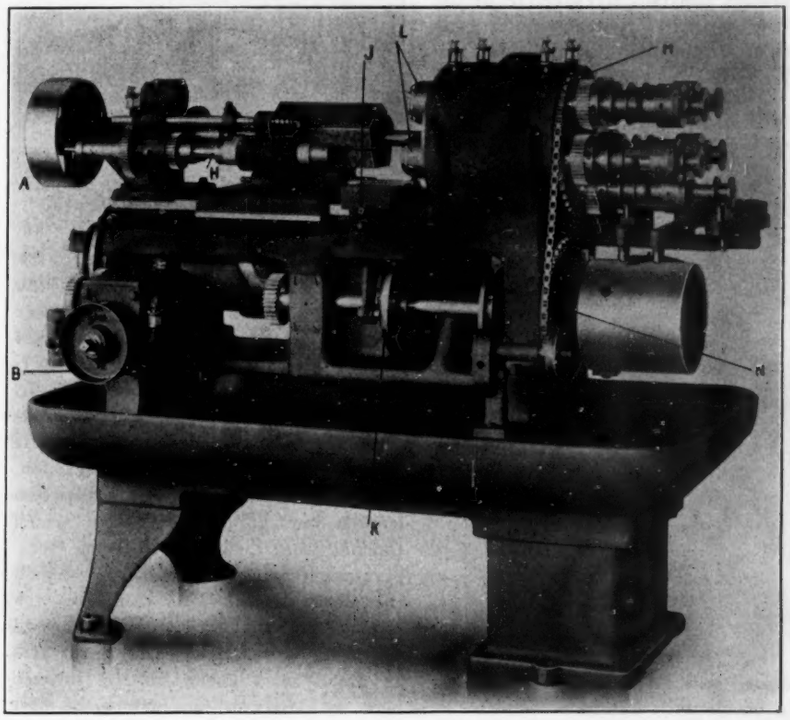


FIG. 2—BACK OF PEERLESS AUTOMATIC MULTIPLE SPINDLE LATHE.

and brought successively into juxtaposition with the locking bushing *e* at the end of each partial revolution of the spindle head. It will be seen that the locking bolt will lock the spindle head accurately and effectively even though it should fit quite loosely into the cylindrical part of locking bushing *e*. It is kept in place by the tension spring and withdrawn by means of the lever and cam shown in Fig. 3. Fig. 4 shows a detailed view of the locking mechanism proper.

The partial revolution of the spindle head is accomplished by means of a sproket wheel M, integral with the spindle head, a sprocket wheel N carried by the cam drum, Fig. 2, a chain to connect these sprockets, a clutch pawl carried by the cam drum and a

cam secured to the bed frame to operate the pawl. The operation of this mechanism is clearly shown by Figs. 3 and 5. The full lines in Fig. 5 show the pawl in its idle position, the dotted lines showing its operating position. In Fig. 3 the idle position of the pawl is shown at *f*, the operating position at *g*. This pawl, which has very easy and smooth engaging and disengaging action, locks the sprocket to the cam drum while it travels over the concentric part of cam *h* and through the chain revolves the spindle head.

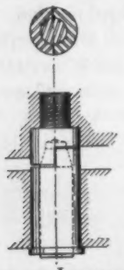


FIG. 4—DETAIL OF LOCKING MECHANISM.

The transverse tool slides are operated by means of racks, segment gear levers and the cams carried by the cam disk. The racks are adjusted by the adjusting screws previously referred to. The operation of the longitudinal tool slide is self explanatory as shown by Figs. 1 and 2, and the method of securing the cutting tools thereto is plainly shown by Fig. 6. One or more tools can be secured to each tool carrying face of the tool slide and may be adjusted backward or forward to suit requirements. It will be noticed that the familiar forms of overhanging box tools, etc., has been dispensed with.

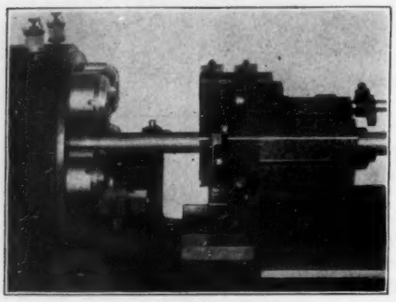


FIG. 6—METHOD OF SECURING CUTTING TOOL TO LONGITUDINAL TOOL SLIDE.

The cutting of threads, either male or female, is accomplished by rotating the threading spindles in the same direction as the stock but at a slower speed. The threading tools are "backed off" by rotating them in the same direction as the stock but at a greater speed. This arrangement makes it possible to cut threads at about one-third of the peripheral speed used for the other cutting tools and does not necessitate the stopping and starting of any of the revolving parts.

Facilities for the use of two threading spindles are provided although but one is shown by the photographs. The second or auxiliary threading spindle is placed directly above the one shown and operates in the same manner, so that two dies, two taps or a tap and a die may be used. Both threading spindles can be independently adjusted and timed to cut any length of thread within the capacity of the machine and are withdrawn from the work without reference to the position of the tool slides.

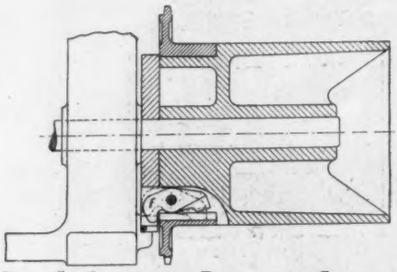


FIG. 5—OPERATING PAWL FOR SPINDLE HEAD.

Change gears which supply 10 different rates of feed to the cutting tools varying from 0.004 inch to 0.026 inch per revolution of the stock spindle are provided, but the fast motion for returning the tools and indexing and locking the spindle head is always constant irrespective of the cutting feeds. The feed can at any time be instantly set out of operation and securely locked into this position so that the machine may be hand operated without danger of having the feed accidentally set in.

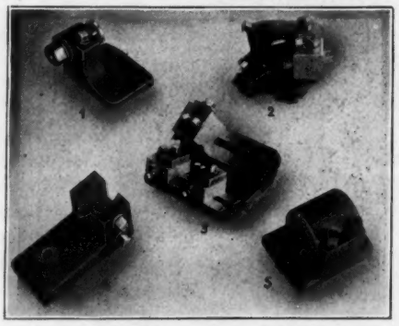


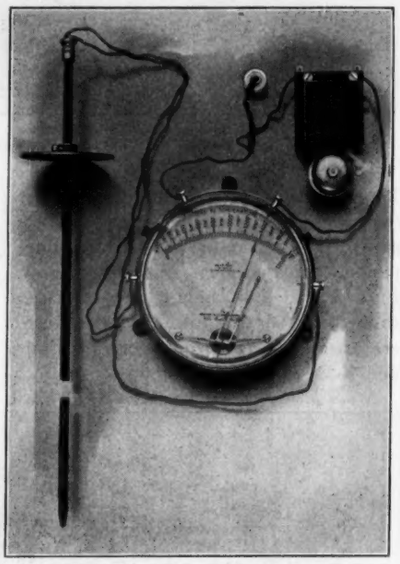
FIG. 7—VARIOUS FORMS OF TOOL HOLDERS.

1—CIRCULAR TOOL HOLDER.
2—SINGLE ROUGH TURNER.
3—COMPOUND FINISHING TURNER.
4—FORMING TOOL HOLDER.
5—HOLDER FOR ROUND TOOLS, AS DRILLS, ETC.

Fig. 7 is a group of standard tool holders.

AN ELECTRIC ALARM PYROMETER.

The accompanying illustration shows the Advance electric alarm pyrometer, which is the latest development of the Wilson-Maeulen Co., 1 East Forty-second street, New York. The pyrometer proper operates on the usual principle of a thermo-couple, generating a current whose intensity is registered by a measuring instrument graduated with a temperature scale. In addition to this usual recording instrument, an alarm attachment is provided, which will give warning of a radical departure in the temperature of the furnace, either above or below fixed limits, between which it is necessary to maintain the temperature for the best results. This alarm is operated by a separate current obtained from a battery or house circuit. This current passes through the indicator and rings the alarm on the bell shown, when the limits in either direction are reached. Two contact fingers are shown on the indicator, being adjustable from the outside of the instrument to whatever temperatures are considered as critical. At the end of each finger is a carbon, and the indicating hand carries two iridium contact points, one of which touches the carbon, when the temperature reaches the point for which the alarm is set. This completes the circuit through the alarm bell and the gong is sounded. The alarm acts as much as a check on the furnace man as a recording instrument. It also furnishes the additional advantage of calling his attention to the

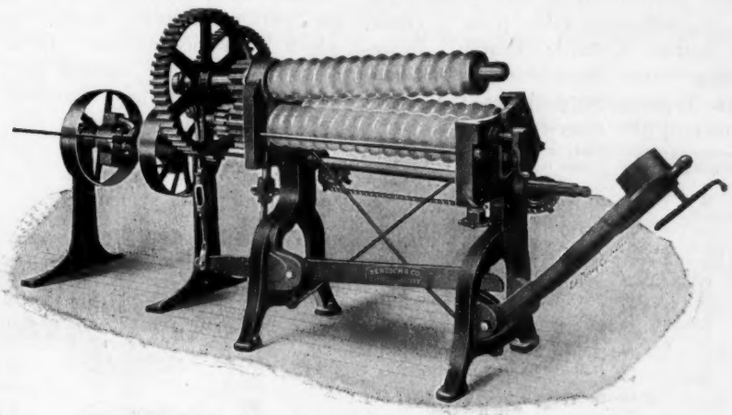


WILSON-MAEULEN ELECTRIC ALARM PYROMETER.

furnace in time to prevent temperatures falling outside of the desired limits.

A ROLLING MILL FOR CORRUGATED SECTIONS.

In the accompanying illustration is shown a forming roll built with corrugated rolls for forming culverts, tanks, barrels, etc., from corrugated sheets. This machine is the product of Bertsch & Co., Cambridge City, Ind. It is built with a patented automatic opening and closing device, which is clearly shown in the illustration. By means of this device, the hinged end of the top roll is raised and supported and the opposite end of the lower roll is simultaneously lowered for removing the formed plate. The movement of these two rolls is accomplished in one operation, which comprises turning down the hinge, as shown. The opening is accomplished by the eccentric motion of the cam on the bottom of the hinge, lifting the adjacent end of the bar which is connected beyond the fulcrum with the top roll, thereby pulling down on that end of the roll. The bottom roll rests on a pivoted post, which allows it to rise and fall with the movement of the lever. As the post rests on the bar just beyond the fulcrum, its weight assists in pulling down on the top roll connection; hence it assists in lifting and balancing the top roll while the machine is open. This connection is accomplished without disturbing the adjustment of the feed rolls, and closing the hinge brings them automatically into position for the next plate. If the plates are of different thicknesses it is necessary to adjust the bottom roll accordingly, by means of screws, as shown in the illustration.



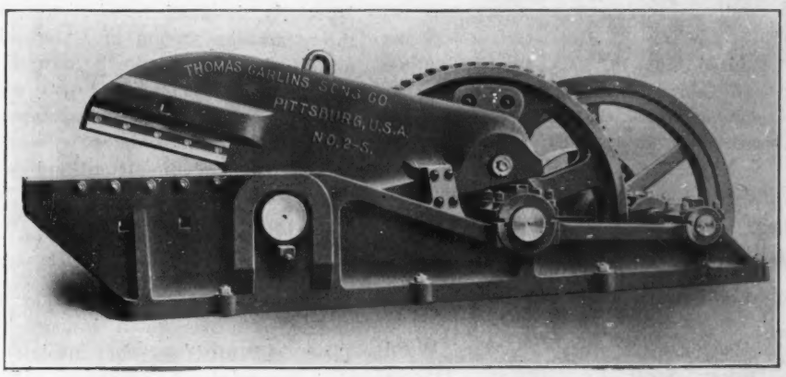
BERTSCH ROLLING MILL FOR CORRUGATED SECTIONS.

A STEEL LEVER SCRAP SHEAR.

A steel lever shear of especially large capacity has been installed in the plant of the Janson Steel & Iron Co., Columbia, Pa., for the handling of heavy stock. The shear has a capacity of cutting material about 6 inches square, and is designed for extremely heavy shop work. The length of its knives is 42 inches and its maximum operating speed is 22 cuts per minute. The total weight is 95,000 pounds. The operating power is transmitted to it by belt.

A notable feature in the construction of the shear is that it is all cast steel with the exception of the balance wheel which is of iron. It was built in the shops of the Thos. Carlin's Sons Co., North Side, Pittsburg, along the lines designed by that company. A similar shear is now being built in the Carlin shops for the California Industrial Co., Los Angeles, Cal.

The same company is also building a cast iron shear of large size which will have 32-inch knives, a speed of 20 cuts per minute and a capacity of 6 x 6-inch stock. It will weigh 150,000 pounds and will be devoted to scrap yard purposes.



CARLIN STEEL LEVER SCRAP SHEAR.

A NEW POLISHING FRAME.

The accompanying illustration shows a new polishing frame or stand, which has been brought out by the New Britain Machine Co., New Britain, Conn. This machine is offered for situations in which a preference exists for a polishing frame running in maple blocks. The frame is of box section, with a wide overhang, the curving forward of the frame toward the workman bringing the wheel where it will polish tubes, cylinders, hollow ware, or irregular shapes without the interference which arises where a straight frame is used. As the frame has ample weight, vibration is eliminated.

NEW BRITAIN POLISHING FRAME STAND.

The end frames are bored to take wooden blocks 2 inches diameter. The adjustment of these blocks is by means of set screws, which, however, do not bind directly on the block.

These screws are each provided with a binder handle, which is permanently attached to the screws and may be swung out of the way when not in use. The base, while offering ample floor support, is thin and forms but little obstruction on the floor. The frame is usually furnished without an arbor, which, however, may be supplied, if required. The belt may lead from the overhead or rear counter shaft, as desired. The total height of the machine to the center of the spindle is 32 inches, and the weight is 250 pounds. The arbor used is 12 inches long.

James Swartz, of New York City, a bond holder of the American Swedish Crucible Steel Co., has begun suit for the appointment of a receiver for the steel company. The company was organized May 18, 1903, and the authorized capital was $5,000,000. The complainant holds that the steel company was never successfully operated.

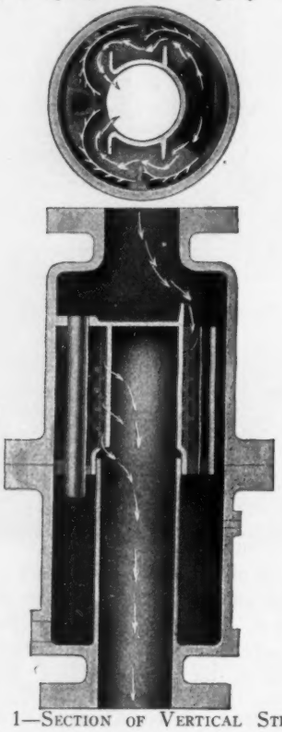


FIG. 1—SECTION OF VERTICAL STRONG STEAM SEPARATOR.

The Camden Tunnel Railroad Co. hase been incorporated with an authorized capital, nominal, of $40,000. It proposes to tunnel the Delaware river from Camden to Philadelphia.

The capital stock of the Ward-Dickey Steel Co., Indiana Harbor, Ind., has been increased to $100,000 from $50,000.

COMPARATIVE VALUE OF LUBRICATING GREASES.

The analysis of lubricating greases is a rather complicated procedure and one which yields little information as to whether the sample is suitable for the purpose to which it is to be applied. It is possible, however, by determinations of the water and the ash present in greases, to give important information regarding the presence of foreign materials. The variation in these constituents is clearly displayed in the following table from a report by Arthur D. Little, Boston. Designating letters have for obvious reasons been substituted for the actual names of the samples:

Designation.	Cost, cents, per lb.	Water, Per cent.	Ash, Per cent.
A	8	2.48	4.56
B	11	7.45	0.62
C	4	20.50	1.92
D	7	4.84	5.54
E	16	1.53	1.53
F	1¾	1.18	7.68
G	5	2.45	2.46
H	6	0.72	2.20
I	6	1.22	3.69
J	6	1.04	1.65
K	5	1.43	4.34
L	7	0.96	2.73
M	15	2.64	2.28

These greases are on the whole of very good character, only one containing an excessive amount of water, but Mr. Little considered the prices excessive and advised that 6 cents per pound was as high as need be paid. He further stated that the samples were practically all of greases made with a small amount of soap as a hardener or solidifier. In some of the cases an alkali soap was used while others contained a lime or aluminum soap.

THE STRONG STEAM AND OIL SEPARATOR.

The accompanying illustrations show two types of the Strong steam and oil separator marketed by the Strong, Carlisle & Hammond Co., Cleveland. The separator is built in both the horizontal and vertical types, and is especially designed to eliminate from the steam the stream of water which usually flows along the bottom of the pipe which is carrying wet steam. Both horizontal and vertical types of separator are built in two sections. The separation of steam and water is effected in the upper half, the lower section serving merely as a water chamber.

The main separating feature in both cases is a separating cage consisting of a perforated 16-gage brass sheet, mounted on the inside of a skeleton frame. This frame fits inside the upper section of the separator, as shown in the illustrations. The frame maintains the perforated sheet in a position about ½-inch from the outer wall of the separator, which is designed to withstand a steam pressure of 250 pounds in the vertical type of separator. A large percentage of the water coming in with the steam is caught in the upper chamber and carried by the conductor pipe to the water chamber. The entrained water passes with the steam around the inner pipe and is thrown by centrifugal force against the perforated brass sheet, through which it readily escapes. It is thus thrown out of the current of steam and prevented from re-entering. In passing around the inner pipe, the shape of the current of steam is changed from a circular to a narrow rectangular one, which causes it to be subjected to a whipping action, which throws off any moisture which may remain in the steam. An annular ring at the bottom of the separating cage prevents the steam from picking any water out of the water chamber.

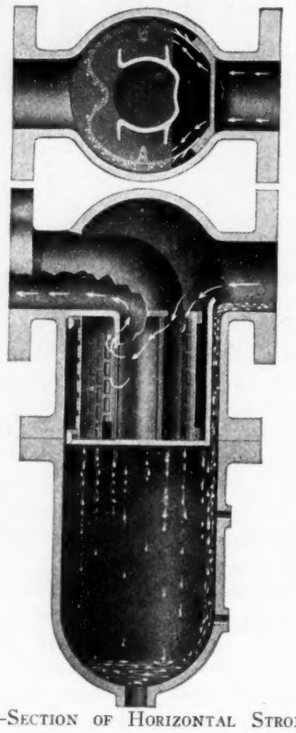


FIG. 2—SECTION OF HORIZONTAL STRONG STEAM SEPARATOR.

In the horizontal type the water running along the bottom of the pipe is caught by the projection of the separating cage, and is thus conducted directly to the water chamber. Aside from this action, the operation is the same as in the vertical type. The separator is made in nine sizes, ranging from 3 to 12 inches.

Prices Rise With Increased Volume.

The reaction of the market that was in progress the week previous did not continue last week. On the contrary, after a momentary hesitation on Monday, the market advanced until new record high prices were reached, both on market leaders and on some inactive stocks. Toward the end of the week the volume of sales increased.

Monday the smallest total of sales for any day since the presidential election was recorded, aggregating 732,400 shares. Net changes were small and prices irregular. All grades of copper were reduced ⅛ cents, and a London market report on prices of the metal was also lower. Tuesday's sales exceeded 1,000,000 shares on an active market, prices advancing so that most of the losses of the previous week were regained. Prices at Wednesday's close were again irregular, some of the early gains being wiped out, and the asking prices of all grades of copper advanced. Thursday being Thanksgiving, a legal holiday, the American markets were closed. A firm opening was noted Friday, and a number of stocks advanced to the highest prices of the year, all grades of copper metal advancing in New York. Irregularity again characterized Saturday's market, a number of inactive specialties advancing to the highest prices of the year, while some of the leaders closed slightly lower.

Money rates continued easy, call loans ruling 1½ to 1¾ per cent, and time rates generally were lower. The London money market was firm and higher on Tuesday, foreshadowing an advance on the Bank of England rate. However, Thursday it was announced that the rate remained unchanged at 2½ per cent. The Bank of France reported gains of more than $5,000,000 in gold for the week, mostly from London. On Monday, announcement was made of the New York City bond sale of $12,500,000 4 per cents, with an average price of 102, a total of 275 bids being received. The statement of clearing house banks and trust companies for the week of five days shows that the banks hold $28,130,650 more than reserve requirements. Clearing house banks report loans increased $7,764,000; deposits increased $11,346,700; reserve increased $1,367,700, and the percentage of actual reserve as 26.82. Non-member banks and trust companies report aggregate deposits of $1,104,841,100; total cash on hand, $105,905,600, and loans amounting to $991,191,200.

Emigration from the United States exceeded immigration during the past week by nearly 2,000. Commercial failures for the week in the United States were 204, compared with 252 the preceding week and 254 the corresponding week last year. Shares were dealt in to the amount of 3,924,000, compared with 6,004,900 the preceding week and 2,359,025 the corresponding week last year. Bonds, exclusive of government bonds, were sold to the amount of $26,354,000, compared with $28,938 000 the preceding week and $16,448,000 the corresponding week last year.

Copper Stocks.

New York.—Amalgamated Copper closed 85½, a net gain of 2¾.

Boston.—Butte Coalition closed 28½, a net gain of 1¾; Calumet & Arizona closed 121½, a net gain of 2½; Calumet & Hecla closed 690, a net gain of 15; North Butte Mining closed 87¾, a net gain of 2¼; Quincy Mining closed 96, a net loss of ½.

Financial Notes.

Railway Steel Spring Co. declared the regular quarterly dividend of 1¾ per cent on the preferred stock, payable Dec. 21; American Brake Shoe & Foundry Co., the usual quarterly dividend of 1¾ per cent on preferred and 1 per cent on common stock, payable Dec. 31.

The Phoenix Iron & Steel Co., Birmingham, Ala., whose incorporation was recently noted, has chosen Leonard Joseph president and general manager, and Eli Joseph vice president.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo. Nov. 28	Changes in Week	Date 1908 Ann. M't'g	Stock Outstanding	Dividend Basis	Dividend Last Declared	Dividend Date Last Div. Pay.
Allis-Chalmers	14¾	+ ⅛	Sept. 3	19,820,000			
Allis-Chalmers pr	48½	+ ¾		16,150,000	7 cum	1¾ Q.	Feb., 1904
American Can	9¾	+ ¾	Feb. 3	41,233,300			
Am. Can pr	75⅞	+1⅜		41,233,300	7 cum	1¾ Q.	Oct., 1908
Am. Car & Foundry	46¾	+1	June 25	30,000,000		⅞ Q.	Oct., 1908
Am. Car & Fdy. pr	108	+1		30,000,000	7 n. c.	1¾ Q.	Oct., 1908
American Loc	56⅛	+1⅝	Oct. 20	25,000,000	5	1¼ Q.	Aug., 1908
American Loc. pr	110	+1		25 000,000	7 cum	1¾ Q.	Oct , 1908
American Ship	57⅞	.....	Oct. 14	7.600.000	4	1 Q.	June, 1908
American Ship pr	105½	+ ½		7,900,000	7 n. c.	1¾ Q.	Oct., 1908
Am. Steel Foundries. pr.	10	....	Oct. 6	15.810 000			
Am. Steel Foundries(new	40	.....		14,247,400	6 cum	2½	Aug., 1904
Barney & Smith	40	.....	June 2	2,000,000	4	1 Q.	Sept., 1907
Barney & Smith pr	110	.....		2,500 000	8 cum	2 Q.	June, 1908
Bethlehem Steel	23⅛	−1⅝	April 7	14.862.000			
Bethlehem Steel pr	53	−1		14,908.000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	39	+ ⅛	March 17	45.000.000*	6	1½ S. A.	Aug., 1908
Cambria Iron	47	.....		8,468.000*	4	2 S. A.	Sept., 1908
Chicago Pneumatic Tool.	25¼	.....	Feb. 17	6,145,800	4	1 Q.	Oct., 1907
Colorado Fuel	38¾	.....	Oct. 19	34 235.500		3½	April, 1902
Crucible Steel	8¼	− ⅛	Oct. 21	24,578.400			
Crucible Steel pr	53⅛	+ ⅞		24,436.500	7 cum	1 Q.	Dec., 1907
Empire Steel	6	.....	Feb. 26	1,254,770			
Empire Steel pr	50	.....		2 500,000	6 cum	3 S. A.	July, 1908
Fay & Egan	90	.....	Feb. 18	1,000,000	6	1¾ Q.	Nov., 1908
Fay & Egan pr	100	.....		1,000 000	7 cum	1¾ Q.	Nov., 1908
General Electric	159	+5½	May 12	65,167,000	8	2 Q.	Oct., 1908
Harbison-Walker	17	− ¼	Jan. 20	18,000.000		½	Oct., 1907
Harbison-Walker pr	80	+2		9,6 0,000	6 cum	1½ Q.	Oct. 1908
International Pump	31⅞	+ ⅝	June 2	17.787.300		1	April, 1905
International Pump pr	79¾	− ¼		18.835.000	6 cum	1½ Q.	Nov., 1908
Lackawanna Steel	52	+1	March 11	34.971.400			
Lake Sup. Corp	12¾	+⅜	Oct. 7	40,000,000			
New York Air Brake	96¼	+8¼	June 18	8.012,500	8	2 Q.	Oct., 1907
Niles-Bement-Pond	97	.....	Feb. 5	8.500 000	6	1½ Q.	Dec., 1908
Niles-Bement-Pond pr	100	.....		2,000,000	6 cum	1½ Q.	Nov., 1908
Otis Elevator Co.	39	.....	March 16	6.156,500		1½ S. A.	April, 1908
Otis Elevator Co. pr	93	−1		5.449,500	6 n. c.	1½ Q.	Oct., 1908
Penn. Steel	50	.....	May 11	10.750.000			
Penn. Steel pr	104½	.....		16.500 000	7 n. c.	3½ S. A.	Nov., 1908
Pittsburg Coal Co	13½	.....	Feb. 10	28,853.400			Nov., 1906
Pittsburg Coal Co. pr	48	+ ½		27,080.800	7 c.	1¾	April, 1905
Pressed Steel Car	39¾	+1¾	Feb. 19	12,500,000		3	Aug., 1904
Pressed Steel Car pr	98	− ¾		12.500,000	7 n. c.	1¾ Q.	Nov., 1908
Pullman	172	−1	Nov. 11	100 000.000	8	2 Q.	Nov., 1908
Railway Stl. Spring	43½	− ⅝	March 5	13,500,000	4	2 S. A.	Oct., 1908
Railway Stl. Spring pr	101	+ ¼		13,500,000	7 cum	1¾ Q.	Sept., 1908
Rep. Iron & Steel	27¾	+ ¾	Oct. 21	27,191.000			
Rep. Iron & Steel pr.	87¾	+ ¾		20,416.900	7 cum	1¾ Q.	April, 1908
Sloss-Sheffield	79½	+2	March 11	10,000,000	5	1 Q	Dec., 1908
Sloss-Sheffield pr	109¼	....		6,700.000	7 n. c.	1¾ Q.	Sept., 1903
U. S Pipe & Fdy	28	+1¼	June 24	12,500,000	4	1 Q.	Dec., 1907
U. S. Pipe & Fdy pr	75	.....		12 500,000	7 n. c	1¾ Q.	Sept., 1908
U. S. Steel	56¾	+1⅝	April 20	508,302,500	2 n. c.	½ Q.	Dec., 1908
U. S. Steel pr	113	+ ¼		360,281,100	7 cum	1¾ Q.	Nov., 1908
U. S. Steel 5'	102⅜	.....		463,798,000	5	5 A.	.....
Va. Iron, Coal & Coke	67	− ¼	Nov. 17	9,073 680			
Westinghouse Elec	91¾	− ¾	June 24	23 933.200	10	2½ Q.	Oct., 1907
Westinghouse Air Brake	110	+1¼	Oct. 6	14.000,000*		2½ Q.	Oct., 1908

Par value of shares, $100, except those starred (*), $50

NEWS FROM MANY INDUSTRIES

New Buyers:—

The Hess Steel Castings Co., Camden, N. J., has been incorporated by F. R. Hansell, William F. Eidell and John A. McPeak, all of Camden, with $750,000 capital, to manufacture iron, steel, coke, copper, etc., and to construct bridges and buildings.

The Magnus Wilson Co., Brooklyn, to manufacture machinery and do blacksmithing, with $30,000 capital stock authorized, has been incorporated by Frank F. Boulton, Winfred L. Smith, Edward W. Nichols, Arthur W. Smith and Milbourn P. Smith, 116 Broad street, New York City.

Sparling & Holland, Inc., Brooklyn, to manufacture mill supplies, machinery, tools, etc., with an authorized capital of $25,000, has been chartered through Laura Sparling, 573 E. Thirty-second street; Philip R. F. Sparling and William J. Holland, 50 Fulton street; all of Brooklyn.

The W. Eddy Plow Co., Greenwich, N. Y., has filed application for a charter to manufacture agricultural implements, with $100,000 capital stock. The incorporators are: Oscar H. Eddy, Fred W. Eddy and Harry C. Gray, Greenwich, N. Y.

General Pump Appliance Co., New York City, has been incorporated to manufacture valve seats and other parts of pumps as well as other engines and machines, with a capital of $100,000, and has these incorporators: Harry N. Marvin, 11 E. Fourteenth street, and Charles E. Philbrook, The Belleclaire, both of New York; Herman Casler, Canastota, N. Y.

The Racine Electrical Mfg. Co., Racine, Wis., has been incorporatel with $25,000 capital by Charles A. Kroynik, Charles M. Dietrich and Albert E. Anderson.

The American Molding Sand Co., Columbus, O., has been incorporated by W. B. Kizer, C. S. Rose, H. M. Freck, J. A. Tingle and T. M. George, with $25,000 capital.

The Pittsburg Engine & Machine Co., East Liverpool, O., has these incorporators: J. A. May, Iva M. May, B. F. Bennett, Thomas May and R. W. Hill. The capital stock authorized is $10,000.

Theodore Geissman & Co., Inc., Chicago, has been incorporated with a capital of $20,000. The incorporators, Theodore Geissman, Elmer E. Jackson and C. C. Colwell, have been conducting a sales agency in Chicago in the past, handling plates, sheets, bars and various other finished iron and steel products, and that business will be continued in the future without change.

There is an inquiry in the market from C. F. Adams, West Thirty-fifth street, Chicago, for lathes, shapers, drill presses, emery grinders and some wood working tools.

J. Thomas Dovey and August Heaton, Seattle, Wash., have incorporated the Seattle Engineering Co., with a capitalization of $20,000, to engage in general contracting and consulting engineering.

New Construction:—

The Automatic Fender Co., with offices in the Bank of Commerce building, Minneapolis, Minn., will build an $80,000 plant for the manufacture of fenders.

The Green Bay Cornice & Corrugating Co., Green Bay, Wis., is planning to erect a new building early in the year on a site newly acquired. The building will be 159 x 198 feet, of fireproof construction.

The new shops of the Beatrice Iron Works, Beatrice, Neb., are nearing completion and will be ready for occupancy shortly.

The Grafton Machine & Iron Works Co., Grafton, Wis., advises that since its incorporation, recently noted, it has under construction a building to be used for a foundry, and another adjoining to be devoted to building and repairing machinery. Modern machinery has been purchased.

The Walcott-Wood Machine Tool Co., Jackson, Mich., is erecting a new shop of brick, 70 x 153 feet, which is nearly completed. A three-ton traveling crane will be installed in the center shop to handle the heavier machinery. The company reports a gratifying growth of business and is steadily increasing its number of workmen.

The Sheffield Car & Equipment Co., Kansas City, Mo., has erected two buildings 70 x 90 feet which it will equip with modern machinery for a nucleus for its proposed car building and car repair plant.

The American Sheet & Tin Plate Co. is completing some general improvements to its New Castle, Pa., plant, formerly known as the old Greer mill. No additional mills are included in the changes being made, and the plant will still consist of 20 hot mills. The New Castle works have been idle for several months.

The Tropenas Steel Works, New Castle, Del., has awarded contracts for the construction of an addition to its plant, the new structure to be 90 x 150 feet.

Machinery is being installed in the newly completed foundry of A. O. Kehm, North Birmingham, Ala. It is expected that the new plant will be ready for occupancy the first of the year.

The Pennsylvania Steel Co. has resumed the installation of improvements, suspended last fall, at its Cornwall, Pa., ore mines. They include a concentrator plant at North Lebanon and an ore crusher.

Ogden Grove, the site of a famous road house near Chicago, has been purchased by Goetz & Flodin as a site for a new brass foundry. The old site of the firm's foundry has been purchased by the Northwestern railroad for terminal purposes.

The Ontario Iron & Steel Co., Welland, Ont., is increasing its output and erecting a new building 120 x 90 feet, to be used for manufacturing splice bars and rail joints. This will necessitate the employment of 30 additional men.

The Dane Mfg. Co., Ottumwa, Ia., manufacturer of hay stackers, mowers, rakes, etc., is establishing a branch plant at Welland, Ont., where it has purchased 100 acres on which the buildings will be erected. Two hundred men will be employed at the start. The Canadian branch is capitalized at $200,000.

The Georgia Iron Works, Augusta, Ga., founder and machinist, advises that its foundry which was partially destroyed by fire in August has been rebuilt. At this time it is erecting a two story warehouse, pattern storage and pattern shop at a cost of $8,000, the contract for which has been placed.

The Peoria Foundry Co., Peoria, Ill., gray iron castings, advises that in order to replace its foundry, which was destroyed by fire Oct. 14, it has let the contract for the erection of a two-story fireproof brick building, 60 x 144 feet, to the McDonald-Brady Contracting Co., Peoria, Ill., at a cost of $8,000. Equipment, including motors, tumbling mills, cinder mills, elevators and trolley systems has been purchased. The building is now in

course of erection, and will be ready for occupancy about Dec. 20.

General Industrial:—

The Calumet Steel Co., Chicago, has increased its capital stock from $275,000 to $325,000.

The Lee Foundry Co., Anniston, Ala., which was recently incorporated, has purchased the plant of the Anniston Stove Works and will put it into operation immediately.

The Craig Foundry Co., Long Beach, Cal., was recently organized in affiliation with the Craig Ship Building Co. The foundry has been especially equipped to handle large castings.

The United States Cast Iron Pipe & Foundry Co. has been awarded the contract for furnishing 1,000 tons of pipe for reconstruction of the Gadsden, Ala., water system at $17.73 a ton f. o. b. Birmingham.

The new foundry of the Atkinson Foundry & Car Shops, St. Albans, W. Va., has been largely equipped with Northern equipment, including a No. 48 Newten cupola, blower, ladles, and a Northern crane—all furnished by the Northern Engineering Works, Detroit. The Atkinson company will make a line of car wheels, cars, etc., in a very modern plant.

The Williamsport Iron & Nail Co., Williamsport, Pa., advises that it is rebuilding along some of the same lines, following the recent fire. It is looking for a supplemental line to operate with its former business, but has not yet come to any conclusion regarding this feature. Since the adjustment of the fire loss was reached but a few days ago, the complete plans have not been declared.

The Warwick Iron & Steel Co., Pottstown, Pa., has taken possession of the Bassler limestone quarry, at Myerstown, Pa., which it recently acquired. The formal transfer will not be made until Dec. 15. It is said that improvements have been planned to the property to cost probably $40,000, including the boiler house and machinery, together with the plants necessary to the extensive quarrying of stone.

The Acme Harvesting Machine Co. of West Virginia advises that it was recently incorporated to take over the assets, property, etc., of the Acme Harvesting Machine Co. of New Jersey; that its plant is located at Peoria, Ill., and that the officers and directors of the old company have been elected to the same offices in the West Virginia corporation. In addition to the New Jersey company's assets, $500,000 in cash has been paid into the treasury to provide further working capital for the growing business. The company does not contemplate the erection of new buildings at this time but is continually adding to its equipment.

The Reading railway has been granted a permit by the dock department of Philadelphia to combine three piers at Port Richmond into one pier, which will be used exclusively for handling iron ore. This will give a pier 349 feet in width.

The sale of the Pope Mfg. Co.'s plants and other assets for $1,500,000 to a reorganizing committee has been authorized by Vice Chancellor Howe, of New Jersey, and this will conclude insolvency proceedings in which the company has been involved for a year past.

C. L. Wilkins, who has disposed of his interest in a brass foundry at Columbus, O., has leased a building in Peoria, Ill., for brass foundry purposes, and has given employment to 25 experienced brass workers whom he brought with him. The foundry is located in the Peters building, on Broad street.

The recently incorporated Bell Coal & Iron Co., Cincinnati, chose the following officers: President and general manager, D. E. Richards; vice president, George B. Longstreth; secretary and treasurer, A. H. Richards, and counselor, George W. Pratt. The output of four West Virginia and Kentucky mines will be handled by the company.

The G. M. Yost Mfg. Co., Meadville, Pa., manufacturer of high grade vises, advises that its rapidly increasing business has caused it to purchase a large milling machine and edging grinder which it expects to install this week. The company also advises that it has received more inquiries for tools the past week than at any time in the previous six months.

The plant formerly known as the Niles Boiler Co.'s shops at Niles, O., is the object of negotiations by Alliance, O., capitalists, with a view to converting it into a foundry and machine shop. Wade A. Taylor, receiver for the boiler company, is adjusting the affairs of the concern, but says it will probably be some time before a statement can be issued as to the conditions.

Stack No. 4 at the Joliet Works of the Illinois Steel Co. is out for relining. The improvements will also include the erection of four new McClure stoves. The contract for the brick linings for the furnace and stoves has been awarded to the Harbison-Walker Refractories Co., and covers about 2,000,000 brick. The same company will supply the brick for the new Badger Malleable Iron Co. plant at South Milwaukee.

The Mexican National Lines System has given an order for 75,000 tons of 85-pound steel rails to the Monterey Iron & Steel Co., Mexico. The company began rolling the rails Dec. 1.

At the recent monthly meeting of the Warwick Iron & Steel Co. directors, a report was presented showing that orders are steadily increasing and that it will be necessary to put the third blast furnace, now being relined, into blast about the first of the year. Two furnaces of the company are now operating.

The Schaefer Mfg. Co., formerly of Ripon, Wis., manufacturer of marine and stationary engines, gas and gasoline engines, advises that it has removed its plant to Berlin, Wis. The plant at Berlin is equipped with the latest machinery and appliances, and the foundry department has been enlarged and the capacity doubled.

H. J. Dyer and J. B. Rosenberger, proprietors of the St. Cloud Iron Works, St. Cloud, Ia., celebrated the fifteenth anniversary of their partnership Nov. 10, with their employes and a number of friends. When the foundry was shut down for the day, at 3 P. M., tables were set and the event was fittingly celebrated.

The Matthews Electrical Construction Co., Shukerk building, Kansas City, Mo., has been awarded the contract for constructing a municipal electric light plant at Ellinwood, Kans., at $33,700.

The Missouri Valley Bridge Co., Leavenworth, Kans., has secured the contract for the construction of 20 steel and concrete bridges for Atchison county at about $17,000.

The Huber Mfg. Co., Marion, O., has begun the manufacture of a combination road and street roller and traction engine. It completed and shipped the first machine a few weeks ago. The machine weighs 14 tons, and is so constructed that the roller can be detached and a set of front wheels substituted, making a regular 18 horsepower traction engine.

The Vincennes Foundry & Machine Co., Vincennes, Ind., whose incorporation was recently noted, has taken over the old Clarke & Buck foundry and machine shop, which is completely equipped, and will oper-

ate it in the future. The officers of the company are: President, John E. Hartigan; vice president, Joseph J. Faenger; secretary, Edwin Shepard; treasurer, John Hartigan, and general manager, Luke Kennedy. Messrs. J. E. Hartigan and Luke Kennedy were formerly in the Washington shops of the B. & O. Southwestern.

The Petersburg Fire Brick & Tile Co., Coal Grove, O., has received orders for 1,000,000 street paving brick for the improvement of Pike street in the village of Coal Grove.

The American Car & Foundry Co. is arranging to open its Peninsular plant with 2,000 men, and has already started operating its Michigan plant with about 700 men, both in Detroit. Orders for cars from the Harriman, Michigan Central and other lines have started the plants.

The R. & M. Tolsky Co., 438 E. Tenth street, New York City, has incorporated for $12,000 to carry on the business in structural and ornamental iron work heretofore conducted as a partnership. No changes are contemplated.

The pattern making and carpenter shop of the Mesta Machine Co., Pittsburg, was destroyed by fire Nov. 22 entailing a loss of about $40,000, principally in machinery and tools. A few unfinished patterns were also damaged but the fireproof cement pattern storehouse was untouched, and the operation of the plant will not be interfered with. The loss is covered by insurance.

The Aetna Foundry & Machine Co., Warren, has shipped the first carload of structural material and machinery to each of two government dams being built on the Big Sandy river, Kentucky. The Aetna company has a contract for all the iron work, and the Warren City Boiler Works, Warren, O., is doing the structural work for it. The contract involves about 10 carloads of material.

The National Tube Co. will soon be in a position to make open-hearth steel at its Lorain, O., works, six open-hearth furnaces now being under construction. The steel made will be consumed in the girder rail mill of the works. This will be the first time that open-hearth steel will have been made at the Lorain plant, as previously the requirements of the rail mill were supplied by the Carnegie Steel Co.

At the request of the Pennsylvania railroad the complaint of the Manufacturers' Association of York, Pa., against the Pennsylvania and the Western Maryland, involving the rights of interchange of cars between terminals, has been reopened. In some sort or other the same question is pending in the Interstate Commerce Commission, United States circuit courts, and state railroad commissions of Illinois, Louisiana and other states.

H. G. Lloyd, president of the Commercial Trust Co., of Philadelphia on Nov. 24 purchased the bonds of the Lake Superior Corporation held by Philadelphia institutions. Mr. Lloyd announces that he acted merely as an agent. The consummation of the deal ends the long struggle between the Canadian and Philadelphia interests. It is said that Mr. Lloyd represents interests jointly owned by New York and Philadelphia investors.

The Wilbraham-Green Blower Co. announces that after having bought a site on the Philadelphia & Reading railroad, at Pottstown, Pa., and erected buildings and installed machinery, it has moved its works and is now operating its new plant. The company believes that with greatly improved facilities it will be able to take care of a greater increase in business. All communications to the company should be addressed Pottstown, Pa., hereafter.

The Minneapolis Steel & Machinery Co. has taken the contract for installing a new power plant for the Manhattan City & Interurban Railway Co., Manhattan, Kas. The machinery will include an 18 x 36-inch heavy duty Twin-City Corliss engine; two 66-inch by 18-foot horizontal return tubular boilers; one 200-kilowatt direct-current generator, switchboard, pumps, etc.

The Randall Electric Heating Co., New York City, manufacturer of metal products, whose incorporation was recently noted, advises that it is organized for the purpose of manufacturing metal products under a license obtained from the Universal Electric Welding Co. It has a number of contracts on hand, making parts for manufacturers, and will continue to work along this line, as well as to lease machines to manufacturers who would prefer doing their own welding. The Universal company's process mentioned is welding of iron and steel by points or ridges. The Randall company's plant will be located permanently at 40 West Thirteenth street.

Trade Notes:—

John L. Walker, formerly auditor for the Buda Foundry & Mfg. Co., has resigned to accept a position as manager of the "Use-Em-Up" socket department of the American Specialty Co., Chicago.

Paul J. Kalman, No. 805 Pioneer Press building, St. Paul, Minn., Northwestern railroad representative for the Detroit Seamless Steel Tubes Co., Detroit, is, in addition to the railroad business, now handling in St. Paul and Minneapolis, the full line of seamless steel tubing manufactured by that company, including stationary boiler flues and mechanical tubing for automobile construction and other purposes.

John F. Allen, 370-372 Gerard avenue, New York City, has made recent sales of a riveter each to the National Tube Co., Lorain, O., and the C. & O. R. R., Richmond, Va., also to the Acme Harvesting Machine Co., Peoria, Ill. Two riveters have been sold to the Pullman Car Co., Chicago, Ill., these being part of the equipment for the new Pullman shops, which equipment, it is understood, was competed for by every concern in the line in this country. Moreover, although favorable to hydraulic riveters, the Pullman company order was placed with John F. Allen on the claims of superiority of the improved "Allen" machines.

Fires:—

The Snyder & Baker Stove Works, Belleville, Ill., was damaged about $6,500, Nov. 20, by fire which originated in the plating department.

The Cedarburg Foundry Co., Cedarburg, Wis., suffered a loss of about $5,000, Nov. 25. The announcement is made that the plant will be rebuilt.

A fire which started in the machine shop, threatened the car repairing shops of the Pittsburg Bessemer & Lake Erie Railroad Co., at Greenville, Pa., Nov. 26. The loss will amount to about $1,500.

The seven-story brick building of the City Machine Co., 430 Prospect avenue, Cleveland, was damaged on the four upper floors Nov. 21. The company suffered a loss of $10,000 on the building and $5,000 on stock and some machinery. Other losers by the fire were A. B. Schraner Pattern Works, $2,000; Cleveland Switchboard Co., $1,500; Cleveland Pattern Co., $100; United States Pattern Co., $100.

The Weber Works of the International Harvester Co., West Eighteenth and Wallace streets, Englewood, Ill., was damaged about $20,000, Nov. 11.

The plant of the Nebraska-Moline Plow Co., Omaha, Neb., was seriously damaged, Nov. 15, the loss reaching probably $50,000.